

JOURNAL
of the
**American Veterinary Medical
 Association**

FORMERLY
AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Assn.)

EDITED AND PUBLISHED FOR
 The American Veterinary Medical Association

CONVENTION NUMBER

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THE JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION is issued the first of each month. Manuscripts and copy for insertion should be as nearly perfect as possible for the printer and should be received by the tenth of the preceding month to insure insertion in the next month's issue. Volumes begin in April and October.

Communications relating to publication, subscription, advertisements and remittances for the JOURNAL OF THE AMERICAN VETERINARY MEDICAL ASSOCIATION, as well as matters pertaining to the American Veterinary Medical Association and membership, should be sent to Dr. H. Preston Hoskins, Secretary-Editor, 735 Book Bldg., Detroit, Mich.

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JOURNAL
OF THE
American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U. S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 735 Book Building, Detroit, Mich.

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Reprints should be ordered in advance. Prices will be sent upon application.

Vol. LXV, N. S. Vol. 18

August, 1924

No. 5

AN UNEXPECTED TURN

One of the disconcerting features of the tuberculosis eradication campaign is the large percentage of hogs, coming from areas practically free of bovine tuberculosis, that show tuberculous lesions upon postmortem examination in the packing houses. For a long time veterinarians have been taught to believe, and in turn we have tried to convince farmers and others, that if we could eliminate the tuberculous cow the disease among swine would automatically disappear. This belief has been based on the theory that all, or practically all, of our porcine tuberculosis was of bovine origin, contracted as the result of such common practices as allowing hogs to follow cattle in the feed-lot, or feeding unpasteurized creamery by-products to swine.

An incentive for farmers to clean up bovine tuberculosis the packers have offered to pay a premium of ten cents per hundredweight on hogs coming from areas where the disease among cattle had been reduced to a prescribed minimum. The packers figured that they could well afford to pay this premium, as the reduction in the percentage of carcasses or parts condemned for tuberculosis, with its resultant financial saving, would warrant it. The plan met with the approval of all concerned and has been given wide publicity. Now come the reports of large numbers

of hogs, upon which the ten-cent premium has been paid, showing tuberculous lesions at autopsy.

Investigations at the University of Nebraska, made by Van Es, and at the University of Illinois, by Graham, would indicate that a very considerable number of these cases of porcine tuberculosis are the result of infection with the avian type of the tubercle bacillus, which puts an entirely different aspect upon the control of porcine tuberculosis. Unquestionably, there is more tuberculosis among farm poultry than any of us have believed and the chickens on the farm will have to be taken into consideration in any plan for tuberculosis eradication from swine.

Just recently a case came to light in which a herd of cattle was tested and the only reaction occurred in a calf. According to the report, inquiry revealed that this particular calf had been confined, for a time, in a hen-house. The natural conclusion drawn was that the calf had contracted the infection from the chickens. One redeeming feature about avian tuberculosis infections in swine is that the lesions are slight and the condemnations run low.



Fourth Street, Des Moines, looking toward Rock Island Station

OUR MEMBERSHIP CAMPAIGN

Our 1924 membership campaign is in full swing. Applications for membership are being received at an encouraging rate. Our resident secretaries, particularly in Iowa, and those states immediately adjacent, are doing splendid work in soliciting new members and giving publicity to the Des Moines meeting.

A review of the records of the Association for the past 10 years reveals the fact that the Association has had its ups and downs, as measured and recorded by the number of new members admitted each year. The figures are as follows:

1915.....	246	1920.....	316
1916.....	449	1921.....	211
1917.....	553	1922.....	165
1918.....	1028	1923.....	198
1919.....	772		

It will be seen, from these figures, that the number of new members increased each year from 1915 (there was no meeting in 1914) up to 1918. In 1919 there was a slight falling off, and this decrease continued up to the year 1922. In that year the number of new members was less than in any year in the past decade.

For the year 1923 we were able to show a slight increase in the number of new members, and it is our hope that the year 1924 will show a healthy increase over the year 1923. Some states have hundreds of eligible veterinarians, who, for some reason, have never seen fit to affiliate themselves with our national association. In the state where we will meet (Iowa), there are over 500; Kansas and Wisconsin have approximately 250 each; Missouri and Nebraska, in the neighborhood of 200 each; South Dakota and Minnesota about 100 each; and North Dakota about 60. These figures reveal an eligible list of approximately 1660 veterinarians in the territory immediately adjacent to the place of meeting. Every one of these men will receive at least one letter, some of them two, and in some states, three, prior to the opening date of the meeting.

It is interesting to record a common experience when approaching a veterinarian for the purpose of interesting him in becoming a member. The one reason, or excuse, most frequently given by these men, for having failed to join the Association, or perhaps not wanting to, is that the majority of the meetings are held so far away that they are able to attend only a very few of

them. This attitude, of course, is wrong, and indicates an absence of the right viewpoint. This is not the place to elaborate on the reasons why every eligible veterinarian should support the American Veterinary Medical Association, but we take this opportunity, again, to ask every member to look around him and pick out at least one veterinarian who is not a member, and see what can be done to get him in the fold. As we have said many times, the benefits are mutual; we need the members and the members need the Association.

Have You Secured One New Member This Year?



Main Entrance, Central Building, Iowa State College, Ames, Iowa

END OF FOOT-AND-MOUTH OUTBREAK IN SIGHT

Recrudescences of foot-and-mouth disease occurred in two counties in California, Tuolumne and Los Angeles, during the first week in July, in which six herds were involved, necessitating the slaughter of more than 2000 cattle. Both of these counties had been infected earlier in the outbreak, and although a period of six weeks intervened in Tuolumne County, and about ten days in Los Angeles County, during which no new cases had been reported, sanitary officials were in no way alarmed but regarded the "flare-ups" only as incidents that were to be expected, and illustrating the tenacity of the infection and the constant vigilance required upon the part of the veterinarians.

The fact that the end of the present outbreak is regarded as being near is indicated by the title of a paper scheduled to be presented before the A. V. M. A., at Des Moines, this month, by Dr. John R. Mohler, Chief of the Bureau of Animal Industry—"California Foot-and-Mouth Disease Outbreak Eradicated." We hope that it will not be necessary for Dr. Mohler to modify the title of his paper as announced.

Plan To Go To Des Moines, August 19-22.

REDUCED FARES TO DES MOINES

The Certificate Plan has been granted in connection with the Des Moines convention, but the reduced fares to be secured are contingent upon at least 250 of those in attendance at the meeting traveling by rail and securing the proper certificates. These should be requested when you purchase your ticket going to Des Moines. A certificate should be requested, regardless of whether you intend to avail yourself of the reduced fare returning, and regardless of whether you intend to return home by the same route as that selected going to Des Moines.

The members of the Association and visiting veterinarians who attend the convention, as well as dependent members of their families, who have paid the regular one-way fares (tariff fares of 67 cents or more) on the going trip, via routes over which one-way tickets are regularly sold, will be ticketed to their starting points, by the route traversed in going to the convention, at one-half of the normal one-way fare from Des Moines to the original starting point.

Certificates will show the purchase of tickets not earlier than dates specified by the various passenger associations and, when

validated by the Special Agent at Des Moines, will be honored for return trip tickets at one-half of the normal one-way fare, if presented not later than August 26.

The word "Convention" will be stamped or written across the face of contracts and each coupon of tickets sold for the return of persons attending the meeting for which a reduced fare was authorized on the Certificate Plan.



Valley National Bank Building—Location of the
Consolidated Ticket Office in Des Moines

Arrangements have been made to validate the certificates during the four days of the convention, August 19, 20, 21, and 22. The reduced fare for the return journey will not apply unless the holder of the certificate is properly identified, as provided for by the certificate. Such identification will be made by the Secretary at the convention. To avail yourselves of the reduced fare, returning, it will be necessary for you to make the return trip over the same route used in going to Des Moines.

Do not forget that every certificate will count and help us to secure the necessary quota of 250, irrespective of whether it is your intention to use it or not.

Secure your certificate when you purchase your ticket and turn it over to the Secretary when you register at the meeting.

We Have Room For A Thousand New Members This Year.

DES MOINES HOTELS

Hotel	Rooms	Without Bath Per room Two persons	With Bath Per room Two persons	For each additional occupant
BROWN		\$3.00-\$2.50	\$4.50-\$4.00	\$1.00-\$1.50
4th & Chestnut				
CHAMBERLAIN	250	3.00- 3.50	4.00- 6.00	1.50- 2.00
Seventh & Locust				
ELLIOTT	130	2.00- 2.50	3.00- 4.00	1.00- 1.50
219 Fourth Street				
FORT DES MOINES	400	.....	5.00- 8.50	2.00
Tenth & Walnut				
FOSTER	54	2.00- 2.50	2.50- 3.50	1.00
Eighth & Walnut				
FRANKLIN	150	.....	3.00- 5.00	1.00- 2.00
Fifth & Locust				
IRWIN	100	2.25	2.50- 4.00	1.00- 1.50
Sixth & Cherry				
KIRKWOOD	150	2.00- 3.00	3.50- 4.00	1.50- 2.00
Fourth & Walnut				
LLOYD	70	2.00	3.50	1.00
Sixth & High				
MANHATTAN	75	2.50	4.00	.....
313 Fifth Street				
MARTIN	60	2.00- 2.50	3.50- 4.00	1.25
Third & Locust				
NORTHWESTERN	86	2.00- 2.50	3.00- 4.00	.....
Fourth & Walnut				
RANDOLPH	134	2.50- 2.75	3.00- 4.00	1.00- 2.00
Fourth & Court				
ROGERS	75	2.00- 2.50	2.50- 3.50	1.00
Sixth & Mulberry				
SAVERY III	350	.....	4.00- 9.00	2.00
Fourth & Locust				



A. V. M. A.
SECTION
OFFICERS

1923-24



(above)
DR. H. W. CALDWELL
Practitioner
Wheaton, Illinois
Chairman
Section on General
Practice

—
(below)

DR. H. C. H. KERNKAMP
University of Minnesota
St. Paul, Minn.
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(above)
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Section on Education
and Research



(above)
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Dept. of Agriculture
Ottawa, Canada
Chairman
Section on Sanitary
Science and Police

—
(absent)

DR. J. H. McNEIL
State Veterinarian
Secretary
Section on Sanitary
Science and Police



RAILROAD RATES TO DES MOINES

We give here the railroad rates to Des Moines from various points in the United States and Canada. Rates quoted are one-way fares.

<i>City</i>	<i>Railroad</i>	<i>Pullman</i>
Atlanta.....	\$34.74.....	\$12.00
Boston.....	49.62.....	13.88
Buffalo.....	31.70.....	9.38
Chicago.....	12.89.....	3.75*
Cincinnati.....	23.15.....	7.50
Denver.....	24.75.....	8.25
Detroit.....	22.70.....	5.85
Fort Worth.....	26.12.....	10.13
Kansas City.....	8.30.....	3.75*
Minneapolis.....	9.60.....	3.75*
New Orleans		
(via St. L. or K. C.)...	37.58.....	11.25
(via Chicago).....	40.78	
New York.....	45.59.....	12.75
Omaha.....	5.40.....	3.50*
Ottawa, Ont.....	39.50.....	11.88
Philadelphia.....	42.35.....	12.00
Portland.....	69.47.....	23.38
St. Louis.....	12.40.....	3.75
St. Paul.....	9.39.....	3.75*
Washington.....	40.67.....	12.00
Winnipeg, Man.....	25.74.....	8.25

*If day trip is made the chair car rate is considerably less.

CANADIAN MEMBERS PLEASE NOTE

Canadian members who contemplate attending the Des Moines convention should be sure to have with them their A. V. M. A. membership cards, as a means of identification at the point of entry to the United States. Immigration officials have assured us that there will be absolutely no difficulty encountered by our Canadian members going to Des Moines. We are advised that, in addition to the membership card, it might be well for each member to have in his possession a letter of identification signed by some Canadian official, the letter further stating the purpose and duration of the member's visit to the United States.

TRAIN SERVICE TO DES MOINES

ROCK ISLAND LINES—THE OFFICIAL ROUTE

Chicago to Des Moines				
	No. 7	No. 13	No. 5	No. 9
Lv. Chicago	10:00 a.m.	5:33 p.m.	10:00 p.m.	12:50 a.m.
Ar. Des Moines	6:50 p.m.	3:15 a.m.	8:10 a.m.	11:25 a.m.
On train 13 sleeper may be occupied at Des Moines until 7:30 a.m.				
On train 9 sleeper is open at Chicago at 10:15 p.m.				
Kansas City to Des Moines				
	No. 58	No. 70		
Lv. Kansas City	11:30 p.m.	3:00 p.m.		
Ar. Des Moines	7:00 a.m.	10:00 p.m.		
Colorado, Lincoln and Omaha to Des Moines				
	No. 8	No. 6	No. 14	No. 302
Lv. Colorado Springs	10:30 a.m.	8:30 p.m.		
Lv. Denver	10:25 a.m.	10:00 p.m.		
Lv. Lincoln	12:37 a.m.	1:15 p.m.		
Lv. Omaha	2:40 a.m.	3:22 p.m.	6:08 p.m.	6:40 a.m.
Ar. Des Moines	6:55 a.m.	8:10 p.m.	10:45 p.m.	11:35 a.m.
Minneapolis and St. Paul to Des Moines				
	No. 56	No. 68	No. 64-422	Daily except Sunday
Lv. Minneapolis	3:15 p.m.	10:20 p.m.	8:30 a.m.	
Lv. St. Paul	3:55 p.m.	11:00 p.m.	9:10 a.m.	
Ar. Des Moines	11:45 p.m.	7:50 a.m.	6:15 p.m.	

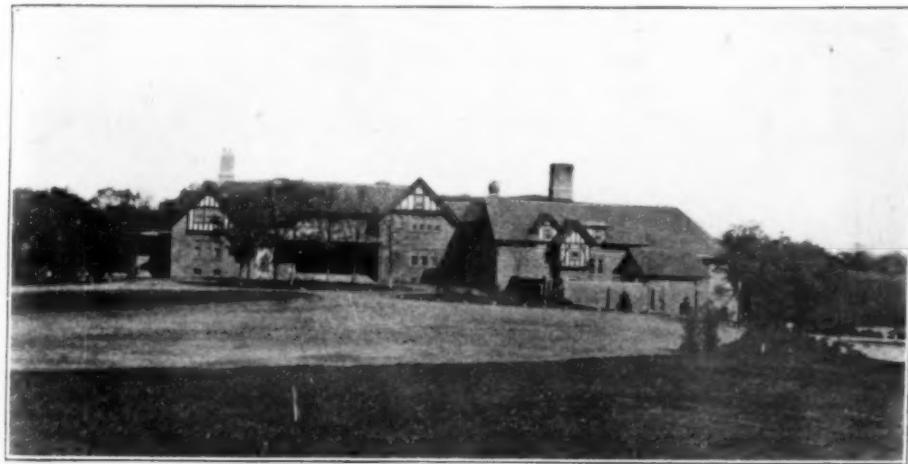


Sixth Street—Des Moines Business Center

EXHIBITORS AT DES MOINES

We have been advised by Dr. H. D. Bergman, in charge of exhibit space at Des Moines, that the following firms would have exhibits at the meeting:

Abbott Laboratories, Chicago, Ill.
Wm. Cooper and Nephews, Chicago, Ill.
Corn States Serum Company, Omaha, Neb.
Alexander Eger, Chicago, Ill.
Faichney Instrument Corporation, Chicago, Ill.
Fort Dodge Serum Company, Fort Dodge, Iowa.
Globe Laboratories, Fort Worth, Texas.
Haussmann and Dunn Company, Chicago, Ill.
Haver-Glover Laboratories, Kansas City, Mo.
Howard Holt Company, Cedar Rapids, Iowa.
Jensen-Salsbury Laboratories, Kansas City, Mo.
Lederle Antitoxin Laboratories, New York, N. Y.
Liberty Laboratories, Ralston, Nebr.
Marrinan Medical Supply Co., St. Paul, Minn.
H. K. Mulford Company, Philadelphia, Pa.
Pitman-Moore Company, Indianapolis, Ind.
Randall-Faichney Company, Roxbury, Mass.
Sharp and Smith, Chicago, Ill.
Zell-Straub Laboratories, Chicago, Ill.



Wakonda Country Club, Des Moines, Iowa.

CAMP SITES AT DES MOINES

Veterinarians who may be thinking about motoring to Des Moines will be glad to know that our 1924 convention city provides delightful camping facilities, at the Tourist Camp, on the east bank of the Des Moines River. The grounds are tightly fenced and policed at all times.

The following facilities are offered campers: gas stoves and dining room, under cover; shower baths, for men and women;

a small store, nearby; and all other conveniences found in the best camps. A fee of fifty cents per car per day is charged. The camp is located about one mile from the Fort Des Moines Hotel. The entire route, from camp to hotel, is over paved streets.

Does Your Wife Know About The Women's Auxiliary?

OUTLINE OF PROGRAM

MONDAY, AUGUST 18, 1924

10:00 A.M. — Meeting of Executive Board, Fort Des Moines Hotel. Other committees will meet during the day for the purpose of getting their reports in shape. If you are on a committee, get in touch with your chairman.

TUESDAY, AUGUST 19, 1924

MORNING — Opening session. Music. Address of Welcome. Response. President's address.

AFTERNOON — General session. Reports of Executive Board and Officers. Election of new members. Report of Committee on Revision of Constitution and By-Laws.

EVENING — Meetings of college alumni associations.

WEDNESDAY, AUGUST 20, 1924

MORNING — Sectional meetings. Papers.

AFTERNOON — General session. Reports of Executive Board and Committees. Election of officers.

EVENING — Banquet, President's Reception, and Dance.

THURSDAY, AUGUST 21, 1924

MORNING — General session. Papers.

AFTERNOON — General session. Reports of Executive Board and Committees. Adoption of Policy. Unfinished business. Installation of officers.

EVENING — Sectional meetings. Papers.

FRIDAY, AUGUST 22, 1924

8:00 A. M. — Trip to Ames by special train. Clinie.

SATURDAY, AUGUST 23, 1924

State Fair—Special Program.

ADDED FEATURES FOR LADIES

- TUESDAY AFTERNOON — "Get Acquainted" Tea.
TUESDAY EVENING — Theatre Party.
WEDNESDAY NOON — Luncheon and Card Party.
WEDNESDAY EVENING — Banquet. President's Reception. Dance.
THURSDAY MORNING — Trip to Hoyt Sherman Place.
THURSDAY AFTERNOON — 2:00 Meeting of Women's Auxiliary.
— 4:00 Automobile Ride and Tea.

PAPERS

Wednesday Morning, August 20, 1924

SECTION ON GENERAL PRACTICE**FIRST SESSION**

"The Common Dissection of the Digestive and Reproductive Organs of the Fowl, with Comments on Digestive Processes and Diseases," Dr. B. F. Kaupp, Poultry Pathological Laboratories, North Carolina State College, Raleigh, N. C. Discussion by Drs. John Patterson, Hedrick, Iowa, and Alvin Broerman, Reynoldsburg, Ohio.

"Common Disorders of the Digestive Tract of Small Animals," Dr. W. J. Lentz, In Charge of Small Animal Clinic, University of Pennsylvania, Philadelphia, Pa. Discussion by Drs. J. C. Flynn, Kansas City, Mo., and J. G. Horning, Houston, Tex.

"Medicines Useful in Sheep Practice," Dr. E. T. Baker, Practitioner, Moscow, Idaho.

"The Auto-Intoxications of Advanced Pregnancy in Cattle," Dr. Otto Menig, Practitioner, Four Lakes, Wash.

"The Handling of Some of the Serious Accidental Injuries Commonly Met in Horse Practice," Dr. R. R. Dykstra, Dean, Division of Veterinary Medicine, Kansas State Agricultural College, Manhattan, Kans. Discussion by Drs. H. B. Treman, Rockwell City, Iowa, and P. L. Cady, Arlington, Nebr.

SECTION ON SANITARY SCIENCE AND POLICE**FIRST SESSION**

"The Whys of Tuberculin Test Failures," Dr. George E. Corwin, Deputy Commissioner of Domestic Animals, Hartford, Conn.

"Disinfection of Premises in Connection with the Eradication of Tuberculosis," Dr. J. A. Barger, B. A. I. Inspector-in-Charge, Tuberculosis Eradication, Des Moines, Iowa.



Campanile, Iowa State College The chimes will welcome you, Aug. 22, 1924.

- "Notes on Postmortem Findings in Cattle Reacting to Tuberculin," Dr. F. H. S. Lowrey, Eastern Divisional Supervisor, Meat Inspection Division, Ottawa, Ont.
- "Milk and Dairy Inspection," Dr. J. B. Hollingsworth, President, International Association of Dairy and Milk Inspectors, Ottawa, Ont.
- "The Essentials of Modern Milk Control," Dr. George W. Grim, Milk Control Officer, Associated Suburban Boards of Health, Ardmore, Pa.
- "Immunization Against Hemorrhagic Septicemia," Drs. John S. Buckley, Chief, and Wm. S. Gochenour, Bacteriologist, Pathological Division, Bureau of Animal Industry, Washington, D. C.

SECTION ON EDUCATION AND RESEARCH

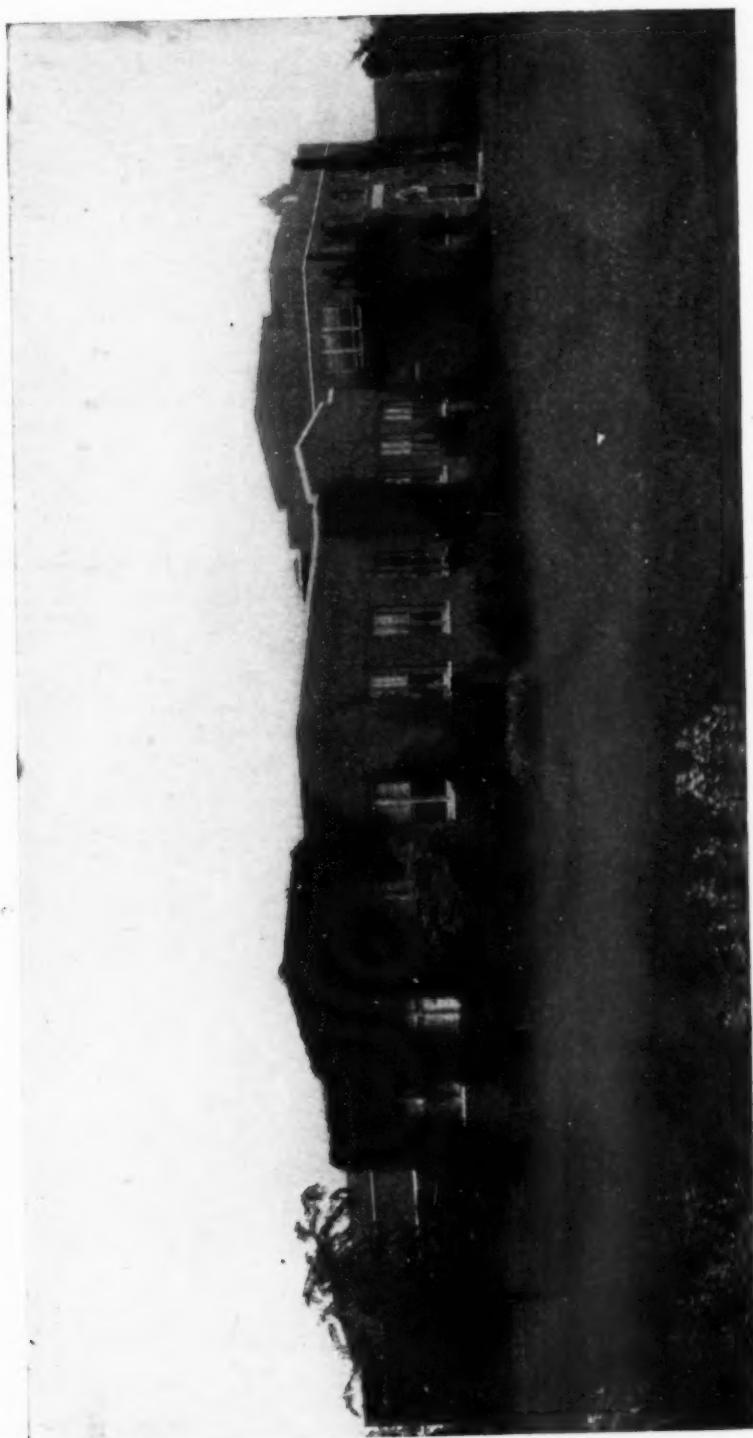
FIRST SESSION

- "Some Suggestions for Promoting and Financing Veterinary Education in America," Dr. Ward Giltner, Dean, Division of Veterinary Science, Michigan Agricultural College, East Lansing, Mich.
- "Further Progress in Veterinary Education," Dr. V. A. Moore, Dean, New York State Veterinary College, Cornell University, Ithaca, N. Y.
- "The Teaching of Veterinary Medicine to Agricultural Students," Dr. J. F. Shigley, Pennsylvania State College, State College, Pa.
- "The Veterinarian in Extension Work," Dr. Don McMahan, Extension Division, North Dakota State College of Agriculture, Agricultural College, N. D.

Thursday Morning, August 21, 1924

GENERAL SESSION

- "Economic Problems of Interest to Veterinarian, Producer and Packer," Mr. H. F. Veenker, Superintendent, John Morrell & Company, Sioux Falls, S. D.
- "The Problem of Adequate Graduate Veterinary Service to the Live Stock Industry," Dr. J. W. Connaway, Chairman, Division of Veterinary Science, University of Missouri, Columbia, Mo.
- "Agricultural Extension, Regulatory Service and Veterinary Practice," Dr. T. E. Munce, State Veterinarian, Harrisburg, Pa.



Veterinary Buildings, Iowa State College, where the clinic will be held.

"California Foot-and-Mouth Disease Outbreak Eradicated,"

Dr. J. R. Mohler, Chief, Bureau of Animal Industry,
Washington, D. C.

"Fox Farming and Its Veterinary Problems" (Illustrated),

Dr. J. A. Allen, Animal Pathologist in Charge, Fox Research
Station, Charlottetown, Prince Edward Island, Canada.

"Prenatal Infestation of Fox Pups with Belascarids" (Abstract

only to be read), Drs. F. B. Hadley, B. L. Warwick and
E. M. Gildow, University of Wisconsin, Madison, Wis.

"The United States Army Veterinary School," Capt. R. A.
Kelser, Army Medical School, Washington, D. C.

Thursday Evening, August 21, 1924

SECTION ON GENERAL PRACTICE

SECOND SESSION

"Experiments on Lowering the Cost of Vaccinating Against Hog
Cholera: Immunizing Young Pigs. Using Mixed Serum
and Virus. Artificial Hog Cholera Virus," Dr. J. W.
Benner, Assistant Professor of Special Research in Animal
Diseases, New York State Veterinary College, Ithaca, N. Y.
Discussion by Drs. M. Dorset, Washington, D. C., and A.
Eichhorn, Pearl River, N. Y.

"The Surgery of the Feet of Cattle," Dr. T. H. Ferguson, Practitioner, Lake Geneva, Wis. Discussion by Drs. J. H.
Blattenberg, Lima, Ohio, and J. N. Frost, Ithaca, N. Y.

"Douching of the Recently Gravid Uterus Compared to Other
Methods of Handling Retention of the Afterbirth in the
Cow," Dr. Herbert Lothe, Practitioner, Waukesha, Wis.
Discussion by Drs. J. V. DeVine, Goshen, N. Y., and S. L.
Stewart, Olathe, Kans.

"On the Origin and Significance of Some Pathological Processes
of the Bovine Uterus" (Illustrated), Dr. E. T. Hallman,
Associate Professor of Animal Pathology, Michigan Agricultural
College, East Lansing, Mich.

SECTION ON EDUCATION AND RESEARCH

SECOND SESSION

"The Present Status of Rabies in the United States," Dr. A.
Eichhorn, Lederle Antitoxin Laboratories, Pearl River, N. Y.

"Bovine Infectious Abortion, Prevention and Control," Dr. M.
F. Barnes, Pathologist, Pennsylvania Bureau of Animal
Industry, Philadelphia, Pa.

- "Animal Disease Control," Dr. R. C. Julien, State Veterinarian, Indianapolis, Ind.
- "Who Shall Vaccinate My Hogs?" Dr. I. K. Atherton, U. S. Inspector-in-Charge, Hog Cholera Work, College Park, Md.
- "An Outbreak of Paratyphoid Dysentery in Lambs," Drs. I. E. Newsom and Floyd Cross, Dept. of Pathology, Colorado Agricultural College, Fort Collins, Colo.
- "An Outbreak of Goose Septicemia with Notes on the Commercial Fattening of Geese," Dr. F. R. Baudette, Poultry Pathologist, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

SECTION ON SANITARY SCIENCE AND POLICE
SECOND SESSION

- "Recent Bureau of Animal Industry Experiment Station Bovine Infectious Abortion Studies," Drs. E. C. Schroeder and W. E. Cotton, Bureau of Animal Industry Experiment Station, Bethesda, Md.
- "The Interpretation of Serological Tests for Abortion Disease," Dr. J. W. Connaway, Chairman, Division of Veterinary Science, University of Missouri, Columbia, Mo.
- "Report on Experimental Work to Determine Whether Avian Tuberculosis is Transmitted Through the Eggs of Tuberculous Fowls," Drs. C. P. Fitch, R. E. Lubbehusen and R. E. Dikmens, Division of Veterinary Medicine, University Farm, St. Paul, Minn.
- "Our Present Knowledge of the Phenomena of Estrous and the Factors Concerned in Their Production, Together with its Bearing on the Problem of Sterility," Drs. H. S. Murphey, G. W. McNutt, B. A. Zupp, and W. A. Aitken, Iowa State College, Ames, Iowa.
- "The Use of Living Suspensions of Streptococci in the Control of Bovine Mastitis," Dr. C. M. Carpenter, Instructor in Bacteriology, New York State Veterinary College, Cornell University, Ithaca, N. Y.

Friday, August 22, 1924

CLINICAL DEMONSTRATIONS

Address of Welcome—President R. A. Pearson, Iowa State College.

Demonstration. Estrous Cycle Specimens—Dr. H. S. Murphey, Ames, Iowa.

Operation. Sterility in Mares—Dr. W. W. Dimock, Lexington, Ky.

Demonstration. Udder Surgery upon Specimens—Dr. T. H. Ferguson, Lake Geneva, Wis.

Exhibit. Foot-and-Mouth Disease Specimens—Dr. John R. Mohler, Washington, D. C.

Demonstration. Treatment for Stomach Worms in Sheep.

Exhibit. Methods of Diagnosis—Dr. E. M. Nighbert, Queen City, Mo.

Exhibit. Parasitic Specimens and Photomicrographs—Drs. E. A. Benbrook, Ames, Iowa, and H. B. Raffensperger, Chicago, Ill.

Exhibit. Specimens of Infectious Enteritis in Pigs—Dr. Chas. Murray, Ames, Iowa.

Demonstration. Treating Otitis Media in the Pig—Dr. W. F. Guard, Ames, Iowa.

Demonstration. Passing the Stomach-tube in Pigs—Drs. C. E. Juhl, Osage, Iowa, and Geo. Young, Syracuse, Nebr.

Demonstration. Lavage and Gavage in the Dog and Cat—Dr. J. H. Horning, Houston, Texas.

Restraint of Small Animals and Methods of Drug Administration—Dr. J. C. Flynn, Kansas City, Mo.

Operation. Castration of a Dog under Local Anesthesia—Dr. C. H. Covault, Ames, Iowa.

Demonstration. Check Intradermic Testing in Cattle and Hogs. Exhibit of Reactors—Dr. G. E. Golden, Sioux City, Iowa.

Demonstration. Artificial Induction of Parturient Collapse and the New System of Therapy for Milk Fever which Does not Necessitate the Inflation of the Udder—Dr. Otto Menig, Four Lakes, Wash.

LOST

Below is given a list of members of our Association for whom we have no correct addresses. First-class mail, sent to these members at the addresses given after their names, has been returned by the post office, undelivered. The Secretary will be very glad if any of our members can furnish correct addresses for any of these men.

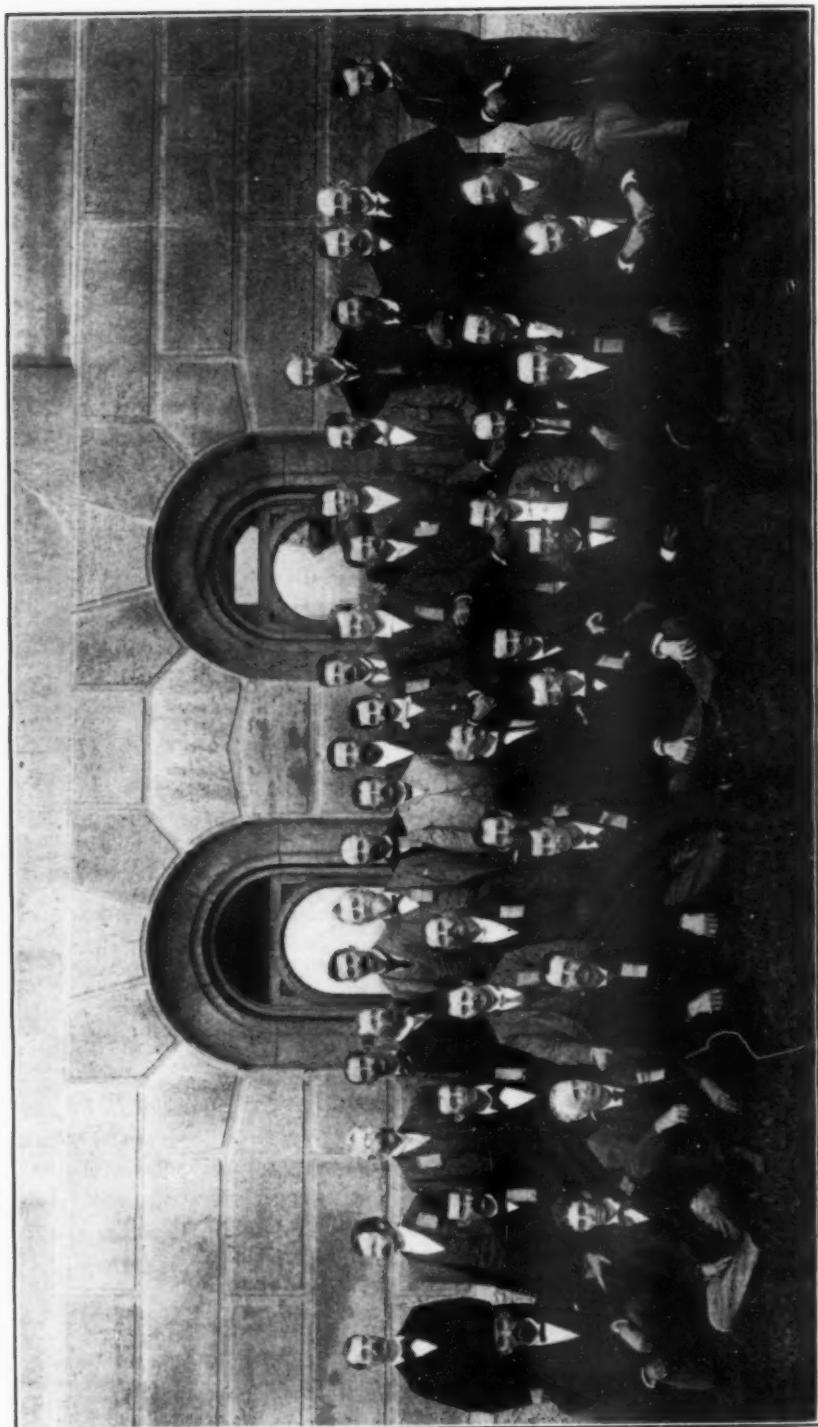
Boman, T. W., Washington, N. C.

Bostrom, G. A., Wahoo, Nebr.

Bourland, C. C., Army Medical School, Washington, D. C.

Boxmeyer, R. E., c/o Lederle Antitoxin Lab., Pearl River, N. Y.

Boyd, G. A., State Vet. Office, Cheyenne, Wyo.



U. S. V. M. A.—DES MOINES, IOWA—SEPT. 10-11-12, 1895

Burns, J. R., 920 Market St., Shreveport, La.
Crawford, N. N., Fort Crook, Nebr.
Eschenbacher, A. B., Gen. Del., Denver, Colo.

ALUMNI ASSOCIATIONS

Secretaries of alumni associations which will hold meetings at Des Moines, the first night of the Convention (Tuesday, August 19), should secure reservations of suitable rooms as early as possible. Communicate with Dr. H. D. Bergman, Iowa State College, Ames, Iowa. He is chairman of the sub-committee having such matters in charge and will help you make a reservation if you tell him what you want.

NOTICE!

The amendments to the constitution and by-laws, as presented at Montreal, in accordance with the motion of Dr. Cary, will come before the Association for final action at Des Moines. These proposed amendments, with those sections of the present constitution and by-laws which they are designed to replace, were published in the JOURNAL, March, 1923, pp. 780-786.

1895—DES MOINES—1924

The interesting group picture on the opposite page was taken at the 1895 meeting of the United States Veterinary Medical Association, held in Des Moines, Iowa. We have made an effort to identify all those in the picture and believe we have succeeded in all but four cases. Those in the picture are:

(Back row, standing, left to right) 1. Dr. Hal C. Simpson, Denison, Iowa; 2. Dr. C. A. Cary, Auburn, Ala.; 3. Dr. D. E. Salmon, Washington, D. C.; 4. Dr. R. H. Harrison, Atchison, Kans.; 5. Dr. Olaf Schwarzkopf, Chicago, Ill.; 6. Dr. J. H. Wattles, Kansas City, Mo.; 7. Dr. Thomas B. Rayner, Philadelphia, Pa.; 8. Dr. Geo. M. Walrod, Storm Lake, Iowa; 9. Dr. W. L. Williams, Ithaca, N. Y.; 10. Dr. T. A. Bown, Chariton, Iowa; 11. Dr. W. Horace Hoskins, Philadelphia, Pa.; 12.; 13. Dr. Leonard Pearson, Philadelphia, Pa.; 14. Dr. T. J. Turner, Indianapolis, Ind.; 15. Dr. Fred H. Osgood, Boston, Mass.; 16. Dr. C. P. Lyman, Boston, Mass.; 17. Dr. Vincent, Shenandoah, Iowa; 18. Dr. John C. Foelker, Allentown, Pa.; 19. Dr. Josiah Miller, Ottumwa, Iowa; 20. Dr. J. T. Duncan, Toronto, Ont.; 21. Dr. Simon J. J. Harger, Philadelphia, Pa.

(Middle row, kneeling, left to right) 1. Dr. W. Drinkwater, Monticello, Iowa; 2. Dr. C. J. Hinckley, Odebolt, Iowa; 3. Dr. N. S. Mayo, Manhattan, Kans.; 4. Dr. A. T. Peters, Lincoln, Nebr.; 5. Dr. S. Miller, Shelby, Iowa; 6.; 7. Dr. D. H. Miller, Harlan, Iowa; 8. Dr. G. A. Johnson, Sioux City, Iowa; 9. Dr. Harry D. Gill, New York, N. Y.; 10. Dr. Sesco Stewart, Kansas City, Kans.; 11. Dr. M. H. Reynolds, St. Anthony Park, Minn.; 12. Dr. C. C. Lyford, Minneapolis, Minn.

(Front row, sitting, left to right) 1. Dr. G. L. Buffington, Brooklyn, Iowa; 2. Dr. S. H. Bauman, Birmingham, Iowa; 3.; 4.; 5. Dr. J. H. McLeod, Charles City, Iowa; 6. Dr. H. L. Stewart, Chariton, Iowa; 7. Dr. A. H. Baker, Chicago, Ill.; 8. Dr. S. Brenton, Detroit, Mich.

THE CORPUS LUTEUM OF THE OX OVARY IN RELATION TO THE ESTROUS CYCLE

Preliminary Report¹

By G. W. McNUTT, Ames, Iowa

Department of Anatomy, Iowa State College,

INTRODUCTION

There is an abundance of material in our current veterinary literature and texts relative to the corpus luteum of the ox ovary. This literature is, however, practically entirely the product of the clinician and the sterility worker, and is not based on accurate morphological and histological findings in the ox but unfortunately upon assumptions drawn from a very cursory reading of the findings of research workers on other species of animals. The statements made are frequently ambiguous and incorrect.

In reviewing the literature we find that Küpfer²⁰ has made a macroscopic study of the corpus luteum of the ox but has made no attempt to work out the histology of the same. Delestre¹² worked on the ovarian follicles and corpus luteum of the ox but unfortunately he worked with material in insufficient quantity and of unknown history and hence could not draw reliable conclusions. Van Beek⁴⁷ has given us an excellent account of the embryology of the ovary of the ox and has carried his work up to the period of sexual maturity.

It was in an effort to work out the morphological changes in this particular species and to correlate these with other cyclic changes in the genital tract, during the estrous cycle and during pregnancy, that this work was attempted. This preliminary report will deal only with the corpus luteum of the estrous cycle. In a later paper the corpus luteum of pregnancy and the cyclic changes in the whole ovary will be discussed.

In the ovary of the ox there is, as a rule, but one ovarian follicle ruptured during the estrual period. Fortunately this fact makes it comparatively easy to follow the corpus luteum of each heat period without confusion, such as would exist in a multiparous animal, where several corpora are formed following estrum. Two corpora lutea of the same age are occasionally met

¹Presented at the sixtieth annual meeting of the American Veterinary Medical Association, Montreal, Canada, August 27-31, 1923.

with in one ovary in the ox and still more rarely a third one in the opposite ovary. One corpus luteum of the same age in each ovary is also a possibility. In this laboratory we have twice found two corpora lutea of one estrus. However, three have been reported by Küpfer, who also states that, in the case of twins or triplets, two or three corpora lutea respectively are usually found in the ovaries.

MATERIAL AND METHODS

The material for this work consists of the ovaries of nineteen animals. Twelve of these were virgin heifers and seven were cows which had given birth to one or more calves. Sixteen of these animals were kept under constant observation by the staff of the Department of Anatomy and the time of the first symptoms of heat noted, in one case the history was obtained from the hospital record, and in two cases the owner's word was accepted as to the time of heat. The animals were then killed for food, at definite periods following the onset of heat, and the desired organs obtained. The stages dating from the onset of heat are as follows: 0 hours, one; 11 hours, still in heat, one; one day, two; and one for each of the following days: 3, 4, 5, 6, 7, 8, 10½, 12, 14, 16, 17, 18, 19 and 20. In some cases the animals were carried through two or more heat periods and found to be regular every twenty-one days, while in others we assumed a cycle of twenty-one days, which is generally conceded to be the average estrous cycle in the ox. These nineteen cases represent a part of a series of ovaries collected by us for the study of the development and morphology of the ox ovary.

The ovaries were placed in a solution of 10% formol and .85% NaCl, or in Bouin's fluid. A small section of each corpus luteum was placed in Flemming's fluid. The stains used were chloral-hematoxylin and eosin, Mallory's triple connective tissue stain and Weigert's iron-hematoxylin followed by picric acid-fuchsin.

The words fat and lipoid are used interchangeably to denote any fatty substance which blackens with osmium tetroxide, as it is known that both true fats and lipoids are blackened by this method.

GROSS CONSIDERATION

We define heat as the period in the estrous cycle during which the animal will accept service. This period in the ox is of short duration, rarely lasting more than 6 to 12 hours. Our specimens show ovulation to have taken place some time between the 24th

and 52nd (palpation 30th to 65th) hours after the beginning of heat. K  pfer records cases of ovulation taking place during heat but also states this is not necessarily so, as heat may occur without ovulation or ovulation may occur without the animal showing any external manifestations. He states that ovulation is in no way influenced by copulation. It has been shown that in certain of the smaller mammals which ovulate spontaneously, as does the cow, that copulation hastens ovulation. We have done no experiments to determine whether or not this is the case in the cow. Copulation was not permitted in our subjects. Hence whether or not this would account for the difference in the ovulation time between our subjects and those of K  pfer, we are unable to state.

CHANGES IN THE FOLLICLES

Following ovulation the follicles contract markedly and the walls are thrown into deep folds which leave a small, very irregular, central cavity (fig. 2) or the cavity may be practically entirely obliterated by the folds. The folds thus produced can be seen distinctly up to 12 to 14 days after heat and can be followed later by connective tissue septa which develop from their base. The follicle shrinks in size from a diameter of 16 to 19 mm. to one of 5 to 8 mm. There is a slight hemorrhage at the point of rupture, due to the rupture of the vessels here. The follicular wall protrudes slightly from the opening and is reddish in color. Usually a small blood clot about the size of a grain of wheat, is found at the point of rupture. The irregular central cavity is not normally filled with a blood clot. In twenty cases of recently ruptured follicles which we have examined no blood clot was found.

K  pfer states that it is remarkable that the interior of the follicle does not become filled with a jet of blood. He recognizes the slight hemorrhage at the point of rupture and the reddish color resulting therefrom.

Marshall,³¹ regarding the sheep, says that the cavities of newly forming corpora lutea are filled with a fluid but no blood clot is present; erythrocytes are seen scattered throughout the granulosa.

There seems to be a variance of opinion as to the formation of a blood clot in other species of mammals, but those who have worked with carefully timed material are quite generally agreed that a blood clot does not occur. A few may be quoted here.

Sabotta⁴⁵ states that, in the mouse, it is common; Van der Stricht⁴⁸ that, in the bat, it is usually slight or lacking; Loeb²¹ that, in the guinea pig, very little extravasated blood is found; and Robinson⁴³ that, in the ferret, "There is no bleeding when rupture occurs either into the follicle or at the margins of the apertures of their walls, and bleeding only occurs occasionally during the redistention of the follicle."

With regard to the cow we fully agree with Corner⁹ who says, "I feel that the evidence indicates that hemorrhage into the corpus luteum of the sow, while not uncommon, is the exception rather than the rule, and is of no anatomical or physiological importance."

In the newly ruptured follicle the central cavity may be obliterated, as already mentioned. This is the usual condition and has been found to be the case in the majority of the specimens which we have examined. A small amount of coagulated liquor or extravasated lymph may be present in the central cavity. This is readily taken care of by organization or by resorption, as the corpus luteum develops. However, in certain cases there seems to be a redistention of the follicles with a fluid which is probably extravasated lymph and which is under considerable pressure. In this case there is no evidence to show that the fluid is resorbed, but rather that it remains here and is quickly walled off by a connective tissue capsule, thus producing a small cyst. Furthermore, there is no evidence to show that this small cyst ever increases in size. It remains in the center of the corpus luteum, apparently without interfering with the normal development and involution of the latter. Of course, where a large quantity of fluid or a large blood clot is present, normal development cannot take place. The cavity is apparently closed by apposition of the walls of the developing corpus at about the fourth day and is entirely healed over by epithelium by about the seventh day after heat.

PROTUBERANCE FREQUENTLY ABSENT

During the rapid growth of the corpus luteum there may be more or less eversion of its substance through the point of rupture of the follicle, resulting in a protuberance being formed. The formation of a protuberance is inconstant. In a great many cases it is absent. When present it is usually 2 to 4 mm. in height and 8 to 9 mm. across. However, we have observed these protuberances 10 mm. in height and 10 to 15 mm. across. A

central depression or pit is usually present on the protuberance, indicating the center of the point of rupture of the follicle. The mature corpus luteum bulges somewhat above the level of the ovarian surface, thus decidedly changing the shape of the ovary.

The corpus is frequently as large or even larger than the remainder of the ovary. Occasionally a corpus luteum may be set off from the ovary by a distinct neck or in rare cases may even become pedunculated, resembling a small-stemmed toadstool or mushroom. (Where a corpus luteum of this appearance was seen, the remaining follicles were very prominent and when ovulation took place an almost complete eversion of the wall of the follicle could easily occur.) The shape of the fully formed corpus luteum may be either globular or oblong. There is quite a variation in its size in different cases. We have found cases of two corpora of the same age in one ovary which varied 2 mm. or more in diameter. When the corpus is oblong we have found its greatest measurement to reach 30 mm. When globular its average diameter is about 22 mm. (These measurements are not limited to the 19 cases here reported but include observations on about 200 cases.)

If the actively functioning corpus be cut open it appears to "bleed," indicative of a rich blood supply. If the corpus is in the process of involution this characteristic is no longer observed and the large vessels which formerly appeared on its surface are small and contracted and frequently invisible.

COLOR CHANGES IN THE CORPORA LUTEA

The corpora lutea, in the nineteen cases reported here, passed through a quite definite series of color changes which are recorded in chart I. To get the true color of the corpus luteum it must be sectioned and examined at once after the animal is killed, for the color may fade rapidly as postmortem changes set in. The color of the corpus luteum shortly after ovulation is a light brown or brownish yellow unless there has been a marked extravasation of erythrocytes into the granulosa, in this case it appears red. The corpus gradually loses its brownish tinge as it develops until at about the seventh day it has changed to an old gold. In its continued development the color becomes brighter and about the fourteenth day is a bright golden yellow. The bright yellow then gradually changes to a true orange at about the twentieth day after heat. As involution of the corpus luteum

continues the color gradually deepens, ultimately changing to a red. The corpus luteum may remain in this stage of regression for months. The color of the red bodies may vary to almost any shade of red, but is usually a bright brick-red. Some old corpora lutea are found which present a yellowish cast and occasionally a true corpus albicans is present. Whether these are continued stages of involution, or variations in form of involution, we are unable to state at this time. Variations from the color changes reported here have been observed in quite a number of cases examined from abattoirs since the collection of this series. The corpus luteum from 7 to 14 days is sometimes a brownish color. Another common variation is a brilliant glistening yellow, with only a touch of orange, seen during the early involutionary stage.

As high as 12 of these small red bodies (old corpora lutea) have been counted in one ovary (cow 50, 5 years old), the corpora of the last two heat periods being present in the other ovary. This cow had not been pregnant for over a year, indicating that the oldest red body was from a heat period of about 290 days past. In another case (cow 47, 7 years old) the right ovary contained 18 old corpora lutea, nine of which had a bright red color, the others being various shades of red or yellow. The left ovary contained one red body and the corpora of the last two heat periods. The date of last pregnancy could not be obtained but we are safe in assuming that the oldest corpus luteum was at least 442 days, or over 14 months old.

MANY CORPORA LUTEA PRESENT IN OLD COWS

In old cows the corpora lutea retrogress more slowly and less completely than in younger cows. It is not uncommon in old animals to find great numbers of visible old corpora lutea present. Case 72 (not included in this series) was a cow about 14 years old. Forty-one corpora lutea were visible to the naked eye. Figuring one pregnancy which terminated 18 months ago, the oldest visible corpus luteum was over 37 months old.

There seems to be some relation between the color of the corpus luteum and the amount and character of its lipoid content (see figures showing lipoid).

In cows which have been pregnant at regular intervals ovaries with a large number of red bodies, such as described above, are usually not seen.

CHART I
SHOWING DIMENSIONS AND CHARACTERISTICS OF CORPUS LUTEUM FROM GROSS EXAMINATION

Age of Corpus Luteum Dating from Onset of Heat	Case Number	Dimensions of C.L. in mm.	Point of Rupture	Protuberance on C.L. Height and Width in mm.	Central Cavity	Color
Virgin heifer 11 hrs.	58	Follicle not ruptured 15				
Virgin heifer 1 day	56	Follicle not ruptured 18x17				
Virgin heifer 1 day Cow	5	Follicle not ruptured 12x15				
	47	Follicle not ruptured 15				
52 hours	60	Closed by small blood clot 7x5.5		Small hemorrhagic area raised about one mm.	1.5x5 mm. Small amount of clear fluid	Light brownish yellow
75 hours	57	8.5x9	Closed by small blood clot	1x4	Small stellate cavity. Very little fluid	Brownish yellow
4 days ⁸	54	12.5x12.5	Closed by apposition of walls not covered by epithelium	Very slight	7x6.5 mm. Clear fluid under considerable pressure	Dull yellow
5 days	55	13x15	No opening but not covered by epithelium	3.5x8.5	Absent	Brownish yellow

				Marked	Absent	Not recorded
6 days Cow	8	C.L.I. 14x14 C.L.I. ¹ 14x12	Entirely healed and covered by epithelium	5x11	5x7 Clear fluid	Old gold
7 days—heifer Birth to 1 calf	64	20x17	Entirely healed	Absent	6x6 Straw colored fluid (cyst)	Old gold
8 days Virgin heifer	61	19x19.5	Entirely healed	10x14	None	Golden yellow
10½ days Virgin heifer	59	27x17	Entirely healed			
12 days	62	C.L.I. 18.5x18.5 C.L.I. ¹ 12x12	Entirely healed			
14 days Virgin heifer	65	20x15	Entirely healed	Absent	None	Bright golden yellow
16 days—heifer Birth to 1 calf	67	18x19	Entirely healed	2x9	None	Orange yellow
17 days—Cow	50	24x21		Absent	None	Orangd yellow
18 days—Cow	68	21.5x22		1x10	None	Dull orange
19 days Virgin heifer	42	17x17		Absent	None	Orange
20 days Virgin heifer	66	20x13.5		Absent	9.5x3.5 (cyst)	Orange
21 days	58	15x19		1x7	4x6 (cyst)	Orange

Age of Corpus Luteum Dating from Onset of Heat	Case Number	Dimensions of C.L. in mm.	Point of Rupture	Protuberance on C.L. Height and Width in mm.	Central Cavity	Color
21 days	56	17x12		Absent	None	Orange
23 days	60	14x9.5		1x6	None	Orange
24 days	57	14x11.5		1x5	None	Orange
25 days	54	9x9		Absent	None	Orange
26 days	55	7x7		Absent	None	Orange with reddish tinge
28 days	61	8x4		Absent	None	Orange with reddish tinge
37 days	67	10.5x6		Absent	None	Orange with reddish tinge
39 days	68	8x6		Absent	None	Brick red
41 days*	66	5.5x2		Absent	None	Bright brick red
44 days	60	5x2		Absent	None	Bright brick red
62 days*	66	7.5x4		Absent	None	Bright brick red

*Determined to be corpus luteum of second and third heat periods respectively only after microscopic examination. In case no. 5 no corpus luteum was present and in other cases where the corpus luteum of the second and third latest heat periods are not mentioned it was impossible to determine which was the most recent upon gross examination.

The corpora lutea of the last two heat periods are, as a rule, distinguishable by their size and color. Sometimes the corpus of the third from the last period can also be determined, but this is not the rule. It is not always possible to determine even the corpus luteum of the second most recent heat period by gross examination. It may resemble too closely some of the older red bodies. Frequently two or three red bodies may be present, with measurements of 6 or 8 x 10, and from gross appearance it is impossible to distinguish which is the most recent. In one young heifer (no. 66), in which only three corpora lutea were found, the two oldest measured 7.5 x 4 mm. and 5.5 x 2 mm. respectively, and both were a bright, brick-red color. Microscopic examination revealed the smaller of the two to be the more recent.

The first gross evidence of involution in the corpus luteum is probably noted in the diminishing blood supply and change of color, as already stated. There is very little decrease in size of the yellow body up to the 20th day. From the 18th to the 20th day the ovarian tissue will be noticed to become heavier over the surface of the corpus and from the 20th day on the ovarian tissue thickens over the corpus luteum quite rapidly. The corpus luteum does not sink into the ovary as it has no power of movement, but the ovarian tissue develops over the corpus, causing it to become deeply imbedded. The more recent of the old corpora lutea may be seen from the surface of the ovary as red spots 1 to 5 mm. across. The older corpora may lose their connection with the surface of the ovary and become entirely covered by the gland substance (embedded).

MICROSCOPIC CONSIDERATION

The mature ovarian follicle is divided into an outer connective tissue and an inner epithelial portion. The connective tissue portion is known as the theca folliculi and is composed of two zones of decidedly different characteristics, the theca externa and the theca interna. The theca externa is simply a portion of the ovarian stroma, the cells of which have arranged themselves parallel with the follicular wall. It contains the larger blood vessels of the follicle and some smooth muscle cells. In the theca interna are found large connective tissue cells. They are elongated, frequently spindle-shaped and measure about 6 x 20 microns. The nucleus is large, oval and granular. A few cells assume a more oval shape, with a spherical nucleus. The

endoplasm contains varying numbers of lipoid granules of a fairly uniform size. These cells gradually increase in size as the ovarian follicle develops. Between these large epithelioid cells is a rich network of blood capillaries which touches every cell, as in an actively functioning gland. A thin reticulum of connective tissue is seen supporting the blood vessels. Much has been said about a membrana propria lying between the theca interna and the epithelial portion of the follicle. Clark² held this to be composed of connective tissue fibers and the same belief is voiced by Corner, with regard to the sow. In the cow there is a connective tissue layer lying next the epithelium but it is very thin and differs in no way from the connective tissue reticulum found supporting the capillaries throughout the theca interna.

The epithelial portion of the follicle is divided into the membrana granulosa and the cumulus oöphorus. The granulosa lies next to the so-called membrana propria and encloses the central cavity, which is filled with a fluid known as liquor folliculi. On the inner surface of the granulosa is the cumulus, which consists of a small clump of cells, near the center of which is the ovum. On opening a large follicle the cumulus can usually be seen macroscopically as a small raised area projecting from the inner surface of the granulosa. The cells of the granulosa in the mature ovarian follicle have a more spherical and somewhat smaller nucleus than the cells of the inner theca. The granulosa cells have a diameter of 9 to 10 microns. Those lying on the inner theca are cuboidal, the others are chiefly polygonal. Fine lipoid granules, smaller than those of the theca cells, are seen throughout the granulosa from sections fixed in Flemming's fluid. The cumulus in maturing follicles is not a solid clump of cells but contains many small antra, which render it relatively easily detached from the granulosa (fig. I.).

ERYTHROCYTES PRESENT

In an apparently mature follicle, from a cow (no. 56), killed after she had been in heat eleven hours, there were erythrocytes found in small clusters in the outer portion of the liquor folliculi and a few scattered throughout the granulosa. Some of the granulosa cells had become somewhat enlarged and were in the active process of phagocytizing the erythrocytes. The exact source of the erythrocytes was not determined. However, the vessels of the theca become distended with blood at this time,

and it is natural to assume that there may have been some hemorrhage into the granulosa.

In the mature follicle leucocytes, especially eosinophiles, are present in large numbers, scattered throughout the theca and granulosa. Some follicles show the eosinophiles to be most pronounced in the outer theca.

It is difficult to determine just when a follicle is mature and of normal structure. When the animal is in heat or has just passed out of heat and a follicle is found with all the cellular elements well preserved we feel that this may be reasonably called a normal mature follicle.

DEVELOPMENT OF THE CORPUS LUTEUM

A few brief statements will be made here concerning the theories advanced regarding the mode of development of the corpus luteum. No effort is made to discuss the work of each individual writer but rather an effort to sum up the various views which have been expressed regarding its formation. For a complete review the reader is referred to the work of Corner⁹ who has given us an excellent discussion. Marshall³² also has discussed the work of the early writers very well in his review of the corpus luteum.

Three general views have been held concerning the origin of the corpus luteum. One group held that at the time of ovulation the epithelial portion of the ovarian follicle, namely the granulosa and cumulus, passed out with the liquor folliculi. Thus the corpus developed entirely from the theca, the large epithelioid cells of the theca interna forming the lutein cells. Another group held that the granulosa remained intact following rupture of the follicle and formed the lutein cells, the theca forming the connective tissue framework of the corpus.

Sobotta,⁴⁵ in 1896, was probably the first to work with carefully timed material. He worked first with the mouse and substantiated the fact that the corpora lutea were normal by the finding of ova or embryos in the uterine tubes or uterus. He held that the granulosa remained intact following rupture and formed the lutein cells. The epithelioid cells of the theca interna reverted back to the characteristic fibroblasts and, with other connective tissue elements of the inner theca, formed the connective tissue reticulum of the corpus luteum. The blood vessels of the inner theca vascularized the corpus and thus this layer was entirely

used up. Sobotta was of the belief that the outer theca did not enter into the formation of the corpus luteum.

The third view of the formation of the corpus luteum was voiced by Rabl,⁴² in 1898. He studied the human corpus luteum and found lutein cells around the periphery, which he considered to be derived from the theca interna, the remainder of the lutein cells coming from the granulosa. Thus he considered the corpus luteum to be derived from both theca interna and granulosa. Van der Stricht,⁴³ three years later, published his studies on the bat which practically coincide with those of Rabl. He followed the epithelioid cells of the inner theca for some time after rupture of the follicle. He later lost them in the further development of the corpus and considered them to become indistinguishable from the granulosa cells.

The view that the corpus luteum is entirely a connective tissue structure seems to have adherents as late as 1910. Delestre¹² published his studies on the cow in this year and is of this belief. His work will be discussed later.

In general it may be said that those investigators who have made an effort to obtain material of known history and of definite periods after ovulation are of the opinion that the granulosa remains intact following ovulation and enters into the formation of the corpus luteum.

MARSHALL'S WORK ON SHEEP

Marshall, in 1905, studied the corpus luteum of the sheep. He dated his material from copulation. He came to the same general conclusions as Sobotta, with the exception of the part played by the outer theca. This, he held, entered into the formation of the corpus luteum by furnishing a good share of the connective tissue framework.

The next year Loeb²¹ described the formation of the corpus luteum of the guinea pig. He also dated his specimens from the time of copulation. His observations support those of Rabl and Van der Stricht. Like the latter he lost the theca cells soon after the development of the corpus luteum began but had carried them far enough to conclude that they formed part of the lutein cells.

In 1911, Meyer³⁶ described the formation of the human corpus luteum. He concluded that some of the cells of the inner theca remained at the periphery of the developing corpus luteum and named them "theca lutein cells."

CORNER'S DESCRIPTION BEST

It remained for Corner, in 1919, to give us the most accurate and complete description of the development of the corpus luteum. His work was done on the sow and with very few exceptions the ova were recovered from the uterine tubes or the uterus, thus giving assurance that normal corpora lutea were present in the ovaries. He has been able to follow the large epithelioid cells of the inner theca through the process of development of the corpus luteum and to identify them in the mature structure. These cells are termed theca lutein cells and those from the granulosa, granulosa lutein cells; terms which I propose to use in discussing the lutein cells in the ox ovary. Corner concludes that the granulosa cells, through their increase in size without division, comprise the greater part of the lutein cells. He found division to take place in the cells of the theca interna, although this layer forms the smaller portion of the lutein cells.

Corner found peculiar cytoplasmic structures in the lutein cells of swine, which aided in differentiating between the granulosa and theca cells. He writes as follows:

"Take a section of the corpus luteum of a pregnant sow whose foetuses are perhaps 100 mm. long, fixed in formol, and stain it with any strong cytoplasmic stain. A study of the lutein cells shows that the cytoplasm contains unstained areas which are roughly concentric to the nucleus, and which appear to form canal-like paths in the cell. In younger corpora the canals grow more and more complex, assuming the form of V-shaped spaces, long clefts, and circles in the cytoplasm, so extensive that the nucleus is surrounded only by a narrow zone of endoplasm. But it is in the corpora lutea of pregnancies under 30 mm. that the highest development of the exoplasmic zone is found. Here the entire outer part of the cell is occupied by a curiously elaborate system of vacuoles, almost every one of them in turn containing a spherule of substance which, although it takes the same strain as the cytoplasm, yet has a more hyalin appearance, and is seen in the section as a bright ring.

Corpora lutea of pregnancies with fetuses more than 140 mm. long contain no trace of this system. . . . The spherules are due to the presence of a lipoid, probably of phosphatid nature, which is sufficiently oily to round up in the presence of water. The round droplets thus produced usually surround the pre-existing globules of neutral fat present in considerable numbers in the early corpus luteum cells of swine. The bodies are not seen in fresh tissue or in material fixed with very rapid coagulants, like osmium tetroxide, which precipitates the proteids before the oil droplets round up."

He states these bodies are present in the corpora lutea of dogs and have been observed in rabbits, by Cohn, that they are not present in the human or in the ox. He found the theca lutein cells do not exhibit this phenomenon, that they "have a tendency to take a deeper cytoplasmic stain" and are also differentiated by "the regularity in size and closely packed disposition of the lipoid granules or the vacuoles left when they disappear or are

dissolved." He found the theca lutein cells may retain their original position near the periphery of the corpus luteum or they may be carried into the granulosa by the ingrowing blood vessels and become mixed with the granulosa lutein cells.

Delestre, in his work on the cow, collected material from abattoirs with no definite history. He concluded that the granulosa was almost entirely drawn out with the ovum at the time of rupture and the lutein cells sprang from the inner theca exclusively. He considers the membrana propria as a definite structure consisting at first of a very fine collagenous layer which gradually thickens as the follicle develops. This layer is designated as the "inner collagenous layer of the theca interna." As the follicle ruptures the cavity shrinks and the inner collaginous layer contracts upon the empty cavity, thickening as it does so, and forms a fibrous connective tissue barrier between the small cavity of the corpus luteum and the theca interna. The writer has specimens of atretic follicles and young cystic corpora lutea which exactly parallel those described by Delestre as normally developing structures.

When the follicle ruptures, in the ox, the liquor folliculi passes out together with the cumulus. The granulosa, with the exception of a few desquamated cells, remains intact. The theca externa contracts markedly, throwing the granulosa and the theca interna into deep folds (fig. 2). The outer theca is little affected by the folding; it may be seen to enter the base of some of the larger folds. This folding greatly facilitates vascularization of the granulosa, and the connective tissue ingrowth into the forthcoming corpus luteum, as the theca interna is thrown almost to the center of the follicle in the deeper folds. There is always more or less hemorrhage at the point of rupture of the follicle, due to ruptured vessels here. In the deeper portions of the follicle hemorrhage is usually slight and is confined between the inner theca and the granulosa. In case of a large hemorrhage it would break through the granulosa and gain the central cavity. The granulosa protrudes more or less at the point of rupture (fig. 4) and is here infiltrated with erythrocytes.

SIZE OF PROTUBERANCE VARIES

The size of the protuberance which forms on the surface of the corpus luteum depends upon the degree of protrusion at the point of rupture of the follicle. The protrusion is very slight in some cases and no protuberance develops (see chart I). Corner

states that the protuberance seems to occur invariably in the cow and to persist throughout pregnancy but he has nowhere indicated that he has done sufficient work on the cow to justify this statement. The blood vessels of the theca are engorged with blood. In some cases extravasated erythrocytes may be present throughout the granulosa. Leucocytes, especially eosinophiles, are present in large numbers and are most numerous in the theca interna. The lipoid content of the granulosa cells rapidly increases. The lipoid granules in the cells of the inner theca are still much larger than those in the granulosa cells.

The process of building up the temporary corpus luteum starts within a few hours after ovulation. The clear line of demarkation between the granulosa and the theca interna is soon lost. The large epithelioid cells of the theca interna remain, however, largely in the same relative position, that is, in the center of the folds produced by the collapse of the follicle (figs. 18, 19, 20). As the corpus develops the theca externa pushes into the base of these folds and finally forms definite connective tissue septa in the center of them. These septa join in the center of the fully formed corpus luteum and form a strand of connective tissue which extends to the surface of the corpus luteum at the point where rupture of the follicle took place. It was due to the fact that the most of the large cells of the inner theca remain in their original position, and by tracing them step by step through the growth of the corpus luteum, that we were able to follow their development and to recognize them in the older corpora lutea. The peculiar protoplasmic phenomena of the lutein cells described by Corner in the sow are not present in the cow.

APPEARANCE ON THIRD DAY

In the specimen collected on the third day after heat the folds have thickened to twice their former diameter (compare figs. 2, 4). The large cells of the inner theca are still in the same position or are separated into small groups which project into the granulosa. Their lipoid granules are still somewhat more numerous than those seen in the granulosa, although there is an increase in the amount of lipoid in the latter cells (figs. 6, 18).

The theca cells are still largely spindle-shaped and mitoses are occasionally seen. The granulosa cells are somewhat enlarged, reaching a diameter of 13 to 15 microns. Their nuclei are frequently very active and mitotic figures are not uncommon. In

contrast to these are seen a large number of cells with clear circular nuclei, containing but few granules, apparently in a resting state. Occasionally a cell is seen in degeneration. Karyorrhexis and karyolysis are seen, with a loss of the cellular membrane and disintegration of the endoplasm. Eosinophiles are numerous in the inner theca and granulosa. The endothelium from the capillaries of the inner theca are pushing rapidly into the granulosa and appear as spindle cells, scattered quite regularly throughout. When stained with iron-hematoxylin-picric acid-fuchsin, the nuclei stain quite dark with hematoxylin, while the endoplasm stains yellow, a shade darker than that of the granulosa cells. Definite capillaries containing blood are commonly seen (fig. 5).

Corner speaks of a spindle-cell invasion of the granulosa in the sow. While he considers these largely of an endothelial nature yet he is not convinced but that a part of them are inwandering cells from the perivascular, spindle-cell zone of the theca interna; a zone we have been unable to demonstrate in the cow. Then, concluding his article, he expresses himself as follows: "It is impossible to convince oneself that there are in the organ any cells other than the two types of lutein cells besides the endothelial cells of the capillary wall, except here and there along the greater vessels which run in from the periphery." Loeb describes this spindle-cell invasion of the guinea pig and considers they are probably endothelial cells. Meyer considered these cells to be entirely endothelial in the human corpus luteum. Delestre considered them as connective tissue cells in the cow.

PROCESS CONTINUED ON FOURTH DAY

Four days after heat, is seen a continuation of the process already described in the three-day corpus. However, no mitosis was seen in the granulosa cells. Leucocytes are common but there is a smaller percentage of eosinophiles.

Five days after heat, the granulosa cells have increased to a diameter of 20 microns, some oblong cells measure as great as 16 x 35 microns. As a rule they have taken on great quantities of lipoid (fig. 19). A few granulosa cells are present which contain very few lipoid inclusions, situated around the periphery of the cell, while in others the endoplasm is simply a mass of lipoid inclusions of fairly uniform size. When no attempt is made to preserve the lipoid the cells present a distinct honeycombed appearance, as a result of the vacuoles produced by the removal

of the fat droplets (fig. 7). In the center of the corpus luteum is a small amount of fibrin, a number of epithelial cells which have become detached, and here and there a leucocyte. These epithelial cells have not increased in size but occasionally show a mitotic figure. The granulosa cells which lie next to these detached elements are in a state of degeneration.

PROBABLY HYALIN DEGENERATION

A little farther from the center of the structure are seen numerous circular, homogeneous, acid-staining bodies. These bodies are sometimes small and included in the endoplasm of the granulosa cells or they may be larger, frequently as large as a dozen or more lutein cells. This is probably a hyalin degeneration. It is present to a greater or less extent in all stages of the developing corpus luteum but we have not seen it in the fully-formed structure. In the center of the original folds groups of theca lutein cells are seen, in apparently the same state as these of the theca interna before rupture of the follicle. Again, theca cells will be seen which are oval to polygonal. In the later cells mitotic figures are abundant. For the most part the theca lutein cells remain near the center of the original folds but some will be seen mixed with the granulosa cells. They lie mostly in small groups. The granulosa lutein cells contain more lipoid than do the theca lutein cells in this stage, as shown in fig. 19. Leucocytes are numerous but the proportionate number of eosinophiles is less. The process of vascularization is still progressing (fig. 7). Mitosis is common in the endothelial cells.

In the six-day corpus luteum, arterioles can be seen in the lutein tissue. With iron-hematoxylin and picric acid-fuchsin stain, the collagenous fibres and fibroblasts stain pink while the lutein cells, endothelium and smooth muscle stain yellow. This contrast enables one to follow the connective tissue invasion readily. Fine connective tissue septa are dividing the structure into small blocks or divisions. These septa consist of fibrils in which are enmeshed quite a number of fibroblasts. Between the septa are the lutein cells, with a network of capillaries and a few arterioles. The theca externa has grown in for some distance from the periphery and carried large vessels with it. Leucocytes are only occasionally seen. The nuclei of the theca lutein cells seem to be quite active but no mitosis is apparent.

Seven days after heat finds the same general condition as seen the previous day. The theca lutein cells contain but very little

lipoid and the granules are small compared to those in the granulosa cells (figs. 10, 20). The latter cells are not uniform in size but vary from 25 x 35 microns to 35 x 65 microns. (It may be that some of the cells which appear smaller are cut to show only the two short dimensions.) Thus the larger cells have increased to approximately six times their former size. A few eosinophiles are still present.

CONDITION ON EIGHTH DAY

The eight-day corpus luteum shows the same excellent contrast with iron-hematoxylin and pieric acid-fuchsin, as seen in the six-day stage. The connective tissue septa have become thicker and fibrils with an occasional fibroblast may be seen passing out into the adjacent lutein structure. Ingrowth from the outer theca is gradually becoming more pronounced. There is a central cavity, six millimeters in diameter, in this corpus luteum, which was filled with a clear fluid. This cavity is walled off by a connective tissue capsule. The lutein cells adjacent to the capsule are almost entirely granulosa cells. Near the periphery of the corpus luteum areas may be seen which are entirely composed of theca lutein cells. However, for the most part, the two types are found as previously described (see 5-day stage).

Ten and one-half days shows the connective tissue still developing as described above. The granulosa cells show no increase in size over the seven-day stage, apparently having completed their growth at seven days. The lipoid content varies greatly in the granulosa cells, some being almost free from lipoid containing a few small granules about 0.5 microns in diameter, others having great quantities of lipoid granules as large as 3 microns in diameter and occasionally one or more granules as great as 8 microns. The theca lutein cells are still found most numerous along the larger septa. They measure about 11 x 22 microns, when oblong, or around 12 to 15 microns, when oval or polygonal. The lipoid content in the theca lutein cells is still very slight compared to that of the granulosa lutein cells (figs. 9, 17).

In 12 days there is very little change over the 10-day corpus luteum (figs. 11, 12).

AMOUNT OF LIPOID INCREASED

In 14 days both granulosa and theca lutein cells contain an increased amount of lipoid. In a few granulosa cells the lipoid droplets have coalesced into fairly large inclusions. This, as

has been noted by a number of writers, is probably the first evidence of any involuntary change in the cells. With iron-hematoxylin and pieric acid-fuchsin, a few of the granulosa cells also appear to be in a state of disintegration. The nuclei stain faintly or show karyolysis.

In the corpus luteum of 16 days there is not quite so much lipoid as in the 14th day. There is very little evidence of involutionary changes in the cells.

Seventeen days shows considerable retrogression in the lutein cells. Some are showing marked disintegration of the cellular elements, while others are still in a fair state of preservation. The other elements of the corpus luteum are still well preserved. These involutionary changes seem to take place in the theca and granulosa cells alike.

Again, in the 18-day corpus luteum, the lutein cells show but slight if any retrogressive changes, indicating that all corpora do not start to regress at the same time in the estrous cycle. Fibroblasts associated with the pink-staining fibrils are more numerous than in the previous stages. There are still small areas where only lutein cells and the endothelium of the capillaries can be detected. The ultimate extent of this connective tissue development will have to be studied in the corpus luteum of pregnancy, as it does not seem to become fully developed in the corpus of the estrous cycle. Corner states that in the sow the fibrils which are given off from the endothelium of the capillaries as fibroblasts are found only along the courses of the larger blood vessels.

With the use of silver impregnations a similar delicate reticulum, as described by Corner, seems to be present in the corpus luteum of the cow in those small areas where fibroblasts and collagenous fibers are not seen. However, the study in this respect is not complete and will have to be left for discussion in a later paper.

CONNECTIVE TISSUE MORE PROMINENT

Nineteen days after heat, the lutein cells are for the most part in a fair state of preservation although some cells show evidence of retrogression. With Flemming's fixation some cells seem to be almost entirely free from lipoid granules, while others have small granules in varying numbers and still others have very large granules throughout the endoplasm. The latter cells are probably in an involutionary stage. The theca lutein cells,

as a rule, do not contain so many lipoid inclusions as the granulosa cells, but occasionally one will be seen as a mass of large granules. Involutionary changes seem to be present in both types of lutein cells in about the same degree. The connective tissue septa of the corpus luteum are now heavier and appear more prominent. This seems to be quite noticeable from this time on and would indicate an increasing firmness of the structure.

At 20 days the lutein cells still retain their cellular outline fairly well, but regressive changes are quite apparent. Large vacuoles are present in the endoplasm where the lipoid has been dissolved out. The nuclei stain lightly and frequently no distinct membrane is visible. The blood vessels and connective tissue elements appear more prominent (figs. 13, 16, 22).

APPEARANCE WHILE IN HEAT

In the corpora lutea of the two animals killed while in heat (21-day C. L.), two very different pictures are seen. One (no. 56) seems to be largely a mass of nuclei, some of which are from lutein cells, but the majority are endothelial or connective tissue nuclei. The endoplasm of the lutein cells has largely disappeared or is in a disintegrated state and it is practically impossible to distinguish the one type of lutein cell from the other, except here and there a large cell remains better preserved and is unquestionably a granulosa lutein cell. In the other case (no. 58) the corpus luteum, while in advanced retrogression, has not reached the stage found in the former case. Quite a number of granulosa lutein cells remain remarkably well preserved. The lipoid content of the lutein cells has increased and there is little uniformity to the size of the granules. The granulosa lutein cells are especially heavily laden with lipoid (figs. 17, 23).

From the examination of older corpora lutea a few lutein cells will be found to remain in a fair state of preservation, while the others disintegrate and eventually disappear. The lipoid content becomes greater up to about 24 days (fig. 24). At this point the granules of some of the cells have run together, forming large masses of lipoid, sometimes filling the entire cell. The granules do not stain uniformly dark with osmic acid. Some will be found which take a very faint stain, while others appear as rings with a clear center. The entire structure appears hazy, having lost the clear, sharp contrasts seen before retrogressive changes set in. From this time on the lipoid content becomes constantly less and concentrates in those few lutein cells which remain preserved

(figs. 8, 24-29 inc.). It is impossible to state to which type of lutein cells the vast majority of these persistent lipid-laden cells belong. Presumably both types of cells are present. Certainly a part of them are granulosa lutein cells, for we have found cells in nearly every stage of retrogression which have the typical characteristics of the granulosa lutein cells. The lutein cells gradually become fewer until after a period of months they have all disappeared. Corner states that in the sow the granulosa lutein cells all disappear soon after involution of the corpus luteum begins and that the theca lutein cells persist.

In following the lipid and the color of the corpus luteum through the different stages it is apparent that the color seems to be related to the quantity and character of the lipid content of the lutein cells, as has been previously stated. The pigment is probably associated with the lipid. In the red bodies the pigment is slowly soluble in alcohol while that of the yellow bodies is readily soluble. The red pigment is readily soluble in ether, chloroform, zylol and benzine, hence it is practically impossible to preserve it by the ordinary methods of preparing slides. By sectioning a red body with the freezing microtome and examining it immediately, irregularly shaped and sized red granules will be seen. (Compare this to the cells fixed in Flemming's fluid in fig. 8).

CAPILLARIES DISAPPEAR READILY

The capillaries frequently disappear from the structure more readily than do the larger vessels, especially the arterioles and larger arteries. The older red bodies may appear as a mass of collapsed or rather contracted arteries and arterioles, between which may be seen a few lutein cells and a little connective tissue and endothelial cells (fig. 29). In other cases the arterioles are few in number and there is more connective tissue present. Where the corpus luteum has regressed, until there remains only a small hyalin mass, a few lutein cells laden with lipid may still persist.

It might well be stated here that there are a large number of lutein cells in the corpus luteum which appear to be intermediate between the granulosa and theca lutein cells. It is impossible to state with certainty the origin of these cells, but we agree with Corner that they arise either from the granulosa or theca interna. The fact that mitosis is not marked in the granulosa cells, and that it was not seen later than 30 hours after ovulation, which

mitosis was plentiful in the theca interna cells and was seen for about 80 hours after ovulation, together with the fact that no degeneration was present in theca lutein cells at this time, is sufficient evidence to prove that the cells of the inner theca play an important part in the formation of the corpus luteum.

DISCUSSION

The changes described above do not take into consideration the detailed changes in development of the ovarian follicle but rather those which result after its rupture. The stages, dated as they are from the onset of heat, show a quite definite cyclic change, as indicated in chart II. This chart compares the cycle of the cow with that of the sow, as worked out by Corner. In the development of the follicle we do not recognize a resting stage of immature follicles as Corner has done in the sow. As we will

CHART II

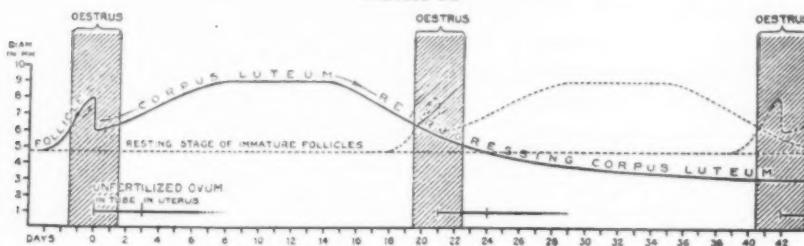


Chart Showing Ovarian Cycle of Sow
(After Corner)

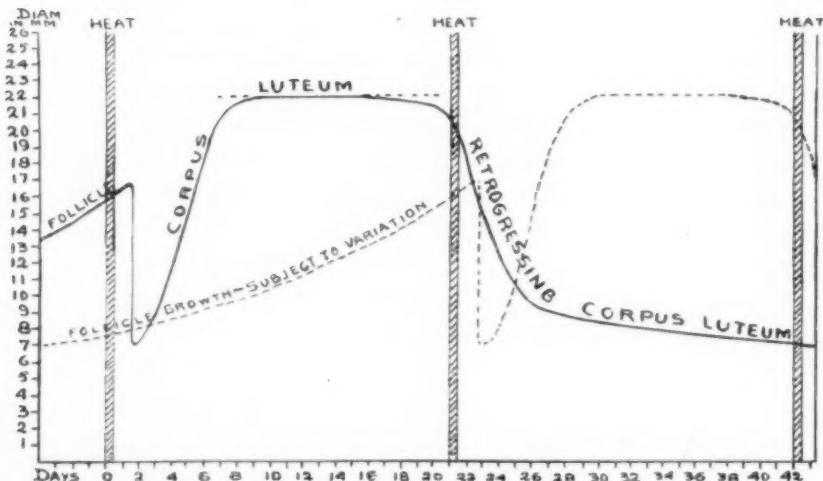


Chart Showing Ovarian Cycle of Cow

show later, follicles show a great variation in their development. The time of ovulation is arbitrarily taken at 40 hours after the beginning of heat. Whether this be sooner or later the decided drop will take place as indicated in the chart.

Rectal examinations on experiment animals, carried out largely by Dr. B. A. Zupp, after the completion of this article, have given some very interesting results. One cow and two virgin heifers were carried over a period of seven months and occasionally opportunity was afforded us to carry other cows through one or more estrous cycles. Grave doubt as to the success and reliability of this method was at first expressed, as it was thought that the constant manipulation of the genitals might interfere with the normal cycle and especially with the ovarian function. The genital organs were handled very carefully and it was found that the cows continued to come in heat every 21 days (occasionally 20, 22 or 23 days) and appeared to go through all the normal cyclic changes in regular sequence. Not a single ovarian follicle was ruptured by rectal manipulation. The following results are given, with Doctor Zupp's permission:

1. Ovulation may take place in females, in which copulation is not permitted, any time between 30 and 65 hours after the onset of heat.
2. The follicle which ruptures shows a great variation in time and manner of development. It may appear to enlarge as early as 8 or 9 days after heat and develop quite gradually, increasing more rapidly toward the end. On the other extreme it may pass unnoticed until the 18th or 19th day after heat and then develop rapidly.
3. The mature follicles usually reach a diameter of 16 to 19 mm., but may rupture when much smaller.
4. It is frequently impossible to tell which follicle is going to rupture until the act has actually taken place, as there may be two, three or four follicles develop since the previous estrum; one of them rupturing and the others becoming atretic. The follicles which become atretic can be noticed to become rapidly softer, fluctuate more readily and disappear in from one to four days. They usually can be felt to soften at the close of the heat period. Occasionally they feel soft and "doughy" even during their development. Follicles may occasionally develop and regress between heat periods.
5. Usually a small pit, or a flat, soft area, can be palpated after ovulation. The corpus luteum can be felt 24 to 36 hours

after ovulation. It develops rapidly and reaches its full development about 9 days after heat. During this time it is usually quite soft to the touch. At about the 11th day after heat it becomes firmer, probably due to an ingrowth of connective tissue. No appreciable decrease in size is detectable until the 19th day. Beginning with the 19th day it decreases, at first very rapidly, and then more slowly, and can be followed for about 30 days after heat with certainty. (Sometimes 3 or 4 corpora lutea can be palpated in the ovaries at one time.) The corpus luteum becomes constantly firmer as it grows older, after the 10th or 11th day following heat.

6. There is no uniformity in the size of the follicles which rupture, nor of the size of the corpora lutea which develop following rupture, in successive estrous periods in the same individual.

7. Spontaneous ovulation always followed a heat period. Ovulation never took place at any other time in the cycle.

It is seen that the time of ovulation may vary 35 hours in different cases. In this regard further examinations may establish an average. Those follicles which develop, fail to rupture, and become atretic following ovulation, must not be considered as cysts but rather as a normal process, as in the ox ovary follicles are constantly developing and regressing. The development and involution of the corpus luteum corresponds very closely with that shown in chart II.

To attempt to divide the cycle of the corpus luteum into stages is quite a difficult matter, as the changes are very gradual. Meyer recognizes the following stages in the human corpus luteum; proliferation, vascularization, maturity and retrogression. This will not hold for the cow, as proliferation of the connective tissue takes place through maturity and, in case of pregnancy, continues for some time. Again, proliferation of the lutein cells and vascularization are taking place together in the early growth, while the latter continues for some time after the former ceases (to about 9 days after heat). It seems to us that the only division which can be made is growth, maturity and involution. Even here the change is so gradual as to make it almost impossible to state the exact day of the change from one to the other. The corpus luteum reaches its maximum size at about 9 days after heat. Slight involutionary changes were seen at 14 days which continued very gradually up to 20 days and then became very marked. Involution may be said to begin at 14 to 16 days.

As a matter of considerable interest, although not in direct relation to this paper, we wish to report the following case at this time. The genital organs were collected from a cow slaughtered at the Iowa Packing Company. This cow was old enough to have given birth to several calves and was pregnant at the time, the fetus measuring 75 cm. The uterus and its contents appeared perfectly normal but upon examination of the ovaries it was found that no mature corpus luteum was present. One small, orange-red corpus luteum, measuring 5.5 x 7 mm., was seen in the right ovary. In all probability this was the corpus luteum of pregnancy and it was in a state of advanced involution. It was very unfortunate that no history could be obtained relative to this cow. The ovaries are shown in fig. 30.

SUMMARY

1. The time and manner of follicular development varies greatly in the same individual and also in different individuals. We are as yet unable to state any definite manner in which the average follicle will develop and rupture. The majority of follicles reach a diameter of from 16 to 19 mm. before rupture but they may rupture as small as 10 mm.
2. The time of ovulation in females, in which copulation is not permitted, is 30 to 65 hours after the onset of heat.
3. The follicle shrinks to a diameter of 6 to 7 mm. following rupture. The cumulus and practically all the liquor folliculi pass out and the granulosa and theca interna are thrown into folds which practically fill the remaining central cavity.
4. No blood clot is normally present in the central cavity after rupture but there is a slight hemorrhage at the point of rupture.
5. A redistention of the central cavity may or may not take place. When it does take place to any appreciable extent it results in a small cyst being formed which remains here throughout the life of the corpus luteum without apparently interfering with its normal cycle.
6. The lutein cells are formed from both the granulosa and the theca interna. Vascularization starts at once by an ingrowth of the capillaries of the theca interna. The larger blood vessels come largely from the theca externa. The connective tissue is derived from both theca.
7. Mitosis is slight in the granulosa and takes place up to the 4th day after the beginning of heat. It is marked in the cells

of the theca interna and is seen up to the 6th day after the beginning of heat.

8. The granulosa lutein cells increase in size about six times by the seventh day, at which time they have reached their greatest dimensions. Vascularization is practically complete at nine days but the connective tissue continues to develop for some time thereafter.

9. Involutionary changes may be seen at 14 to 16 days but are not marked until about 20 days after heat. There is some variation in the time of involution in different cases. Involutionary changes require several months to a year for completion in young animals. As the animal grows older, involution takes place more slowly and less completely. Gross evidence of involutionary corpora lutea have been seen which were over three years old.

10. The color of the corpus luteum of estrus is at first a light brown; about the 7th day, an old gold; by the 14th day, a bright golden yellow (sometimes a brownish color); by the 20th day, an orange or a yellowish orange, eventually changing to a bright brick-red. This color change is associated with the quantity and character of the lipoid in the lutein cells.

ACKNOWLEDGMENT

I am indebted in this work to those workers who have "paved the way" by a study of the corpus luteum in other species of animals. I wish to acknowledge the assistance of my co-workers in this department, in the collection of carefully timed materials and also to thank Doctor H. S. Murphey for his many helpful suggestions and constant inspiration while this work was in progress.

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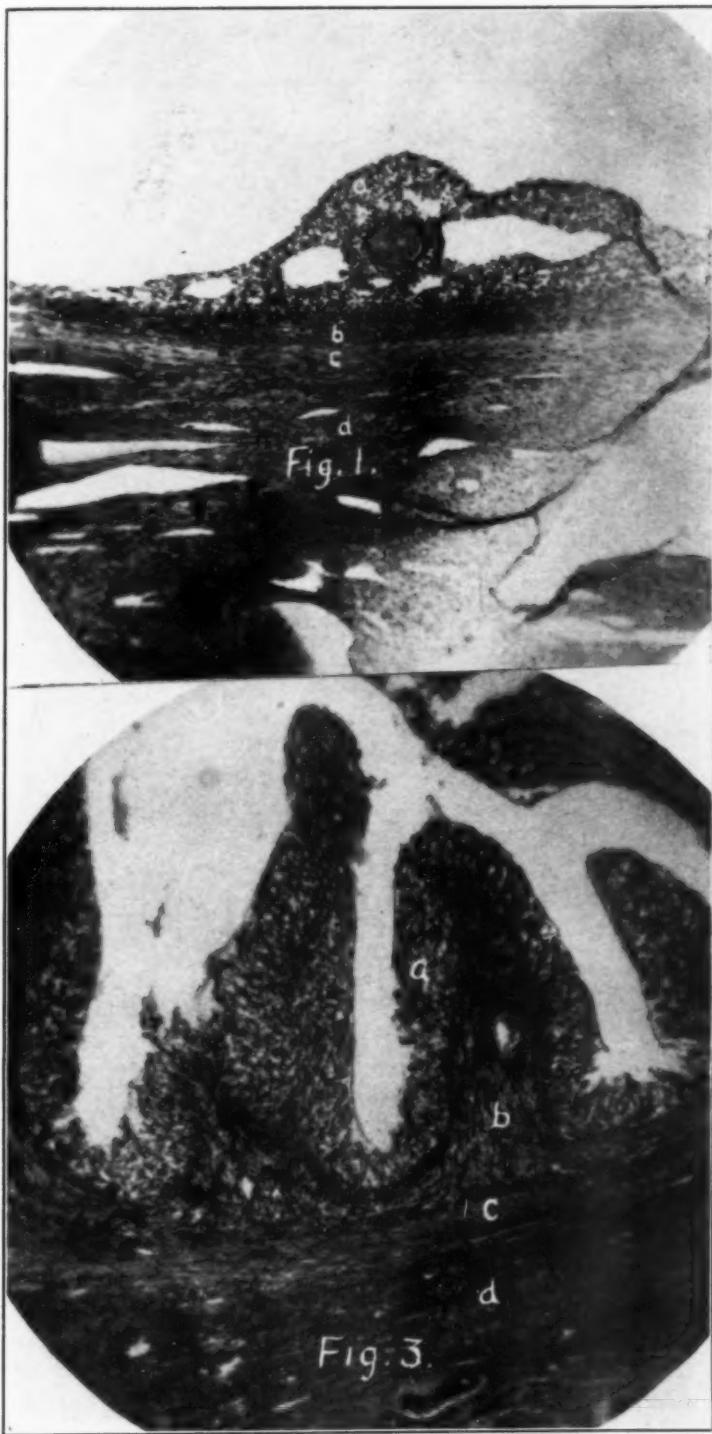




Fig 5



Fig 6



Fig 7



Fig 8

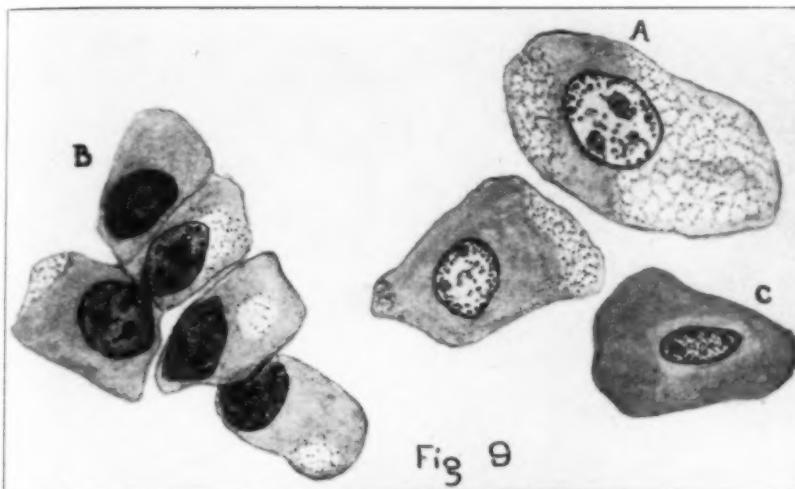


Fig 9

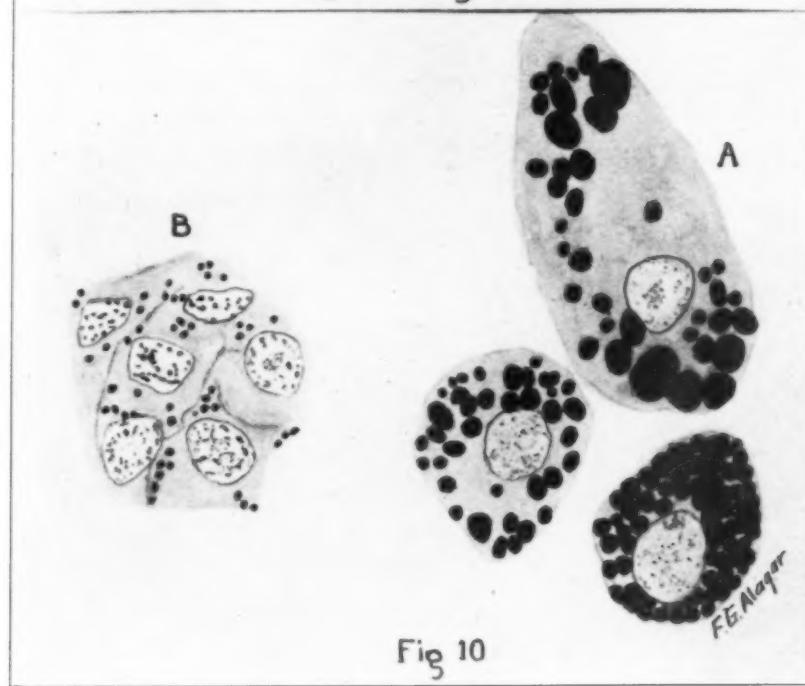


Fig 10



Fig. 2



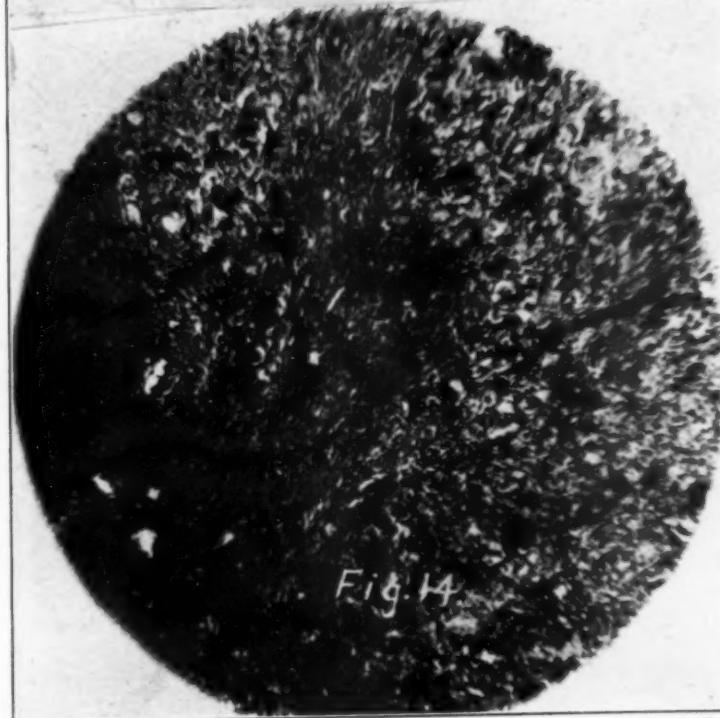
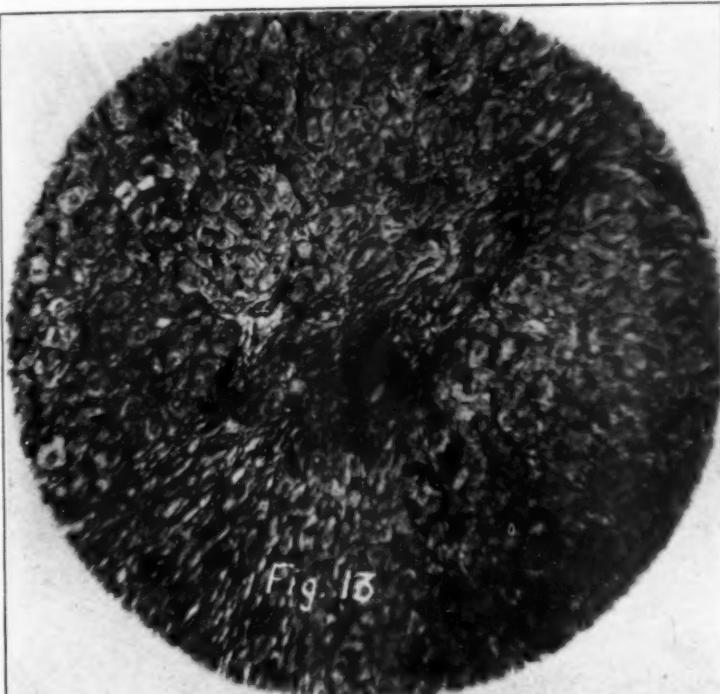
Fig. 4



Fig. 11



Fig. 12



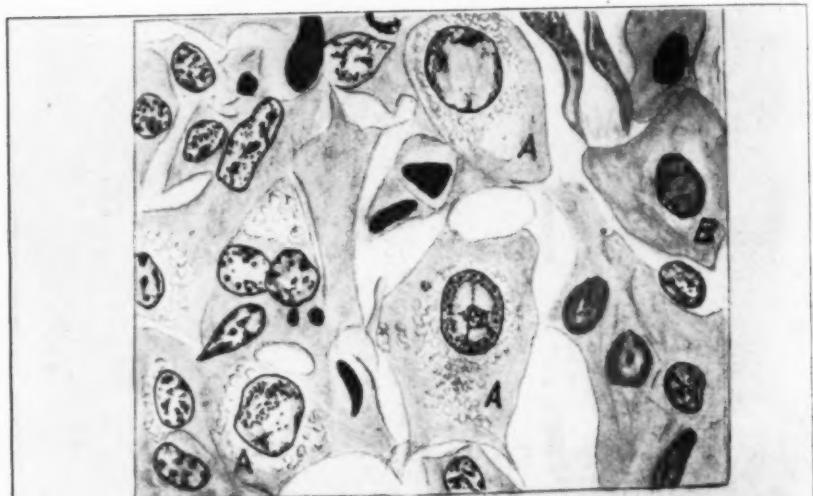


Fig. 15



Fig. 16



Fig. 17

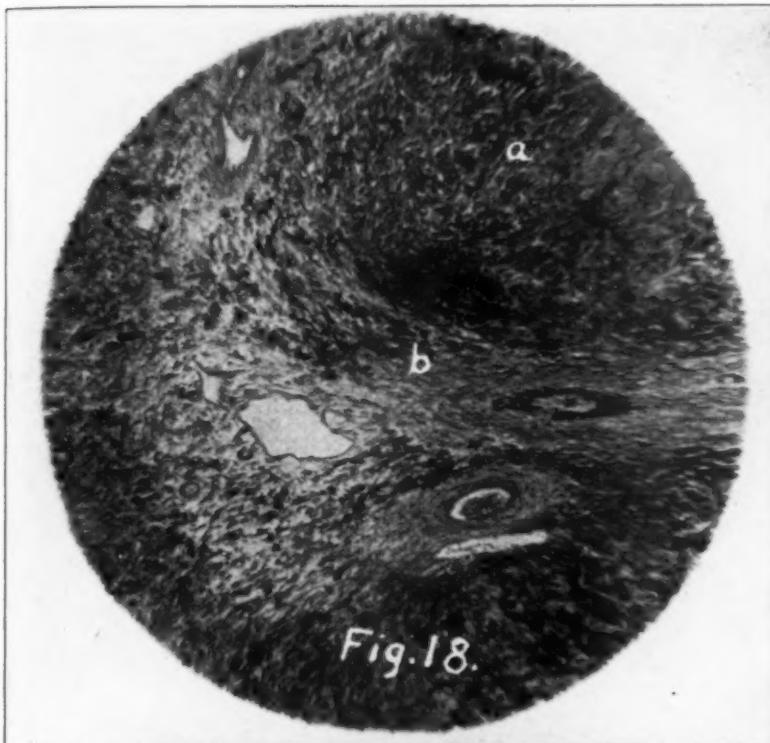


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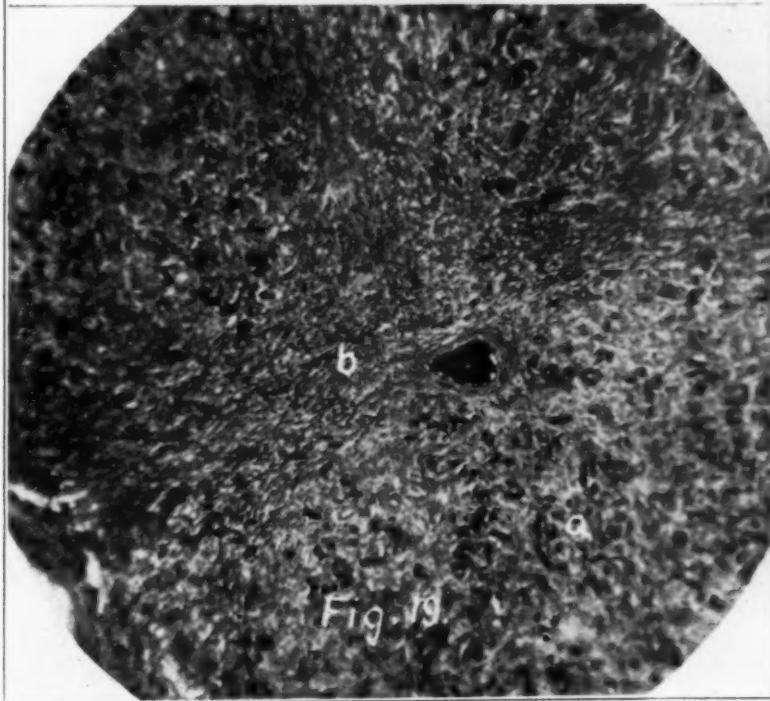


Fig. 19.

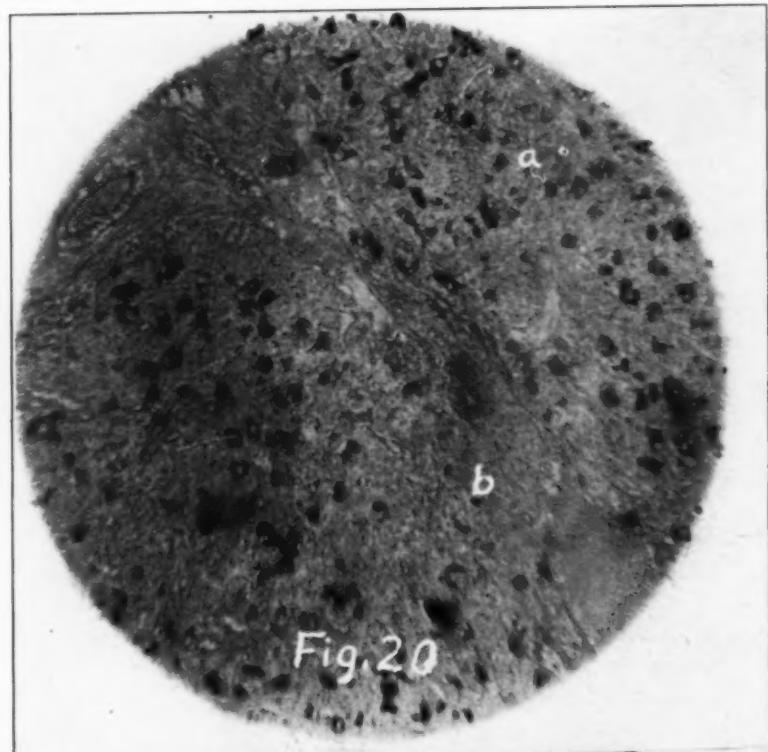


Fig. 20

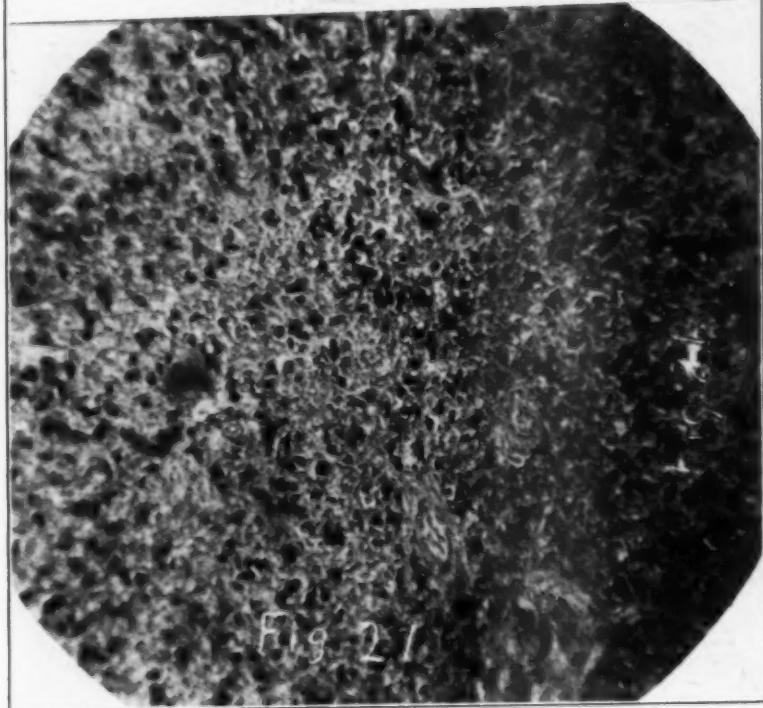
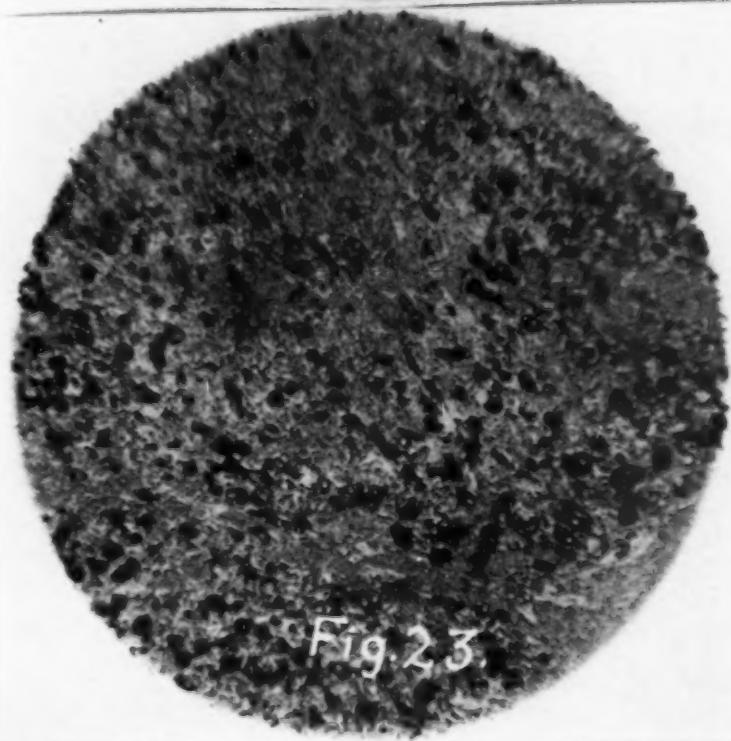
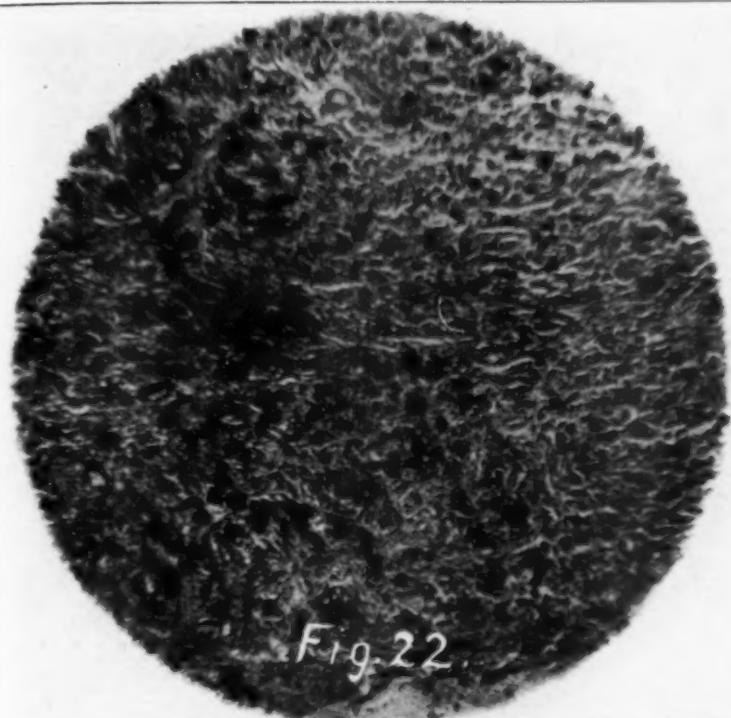


Fig. 21



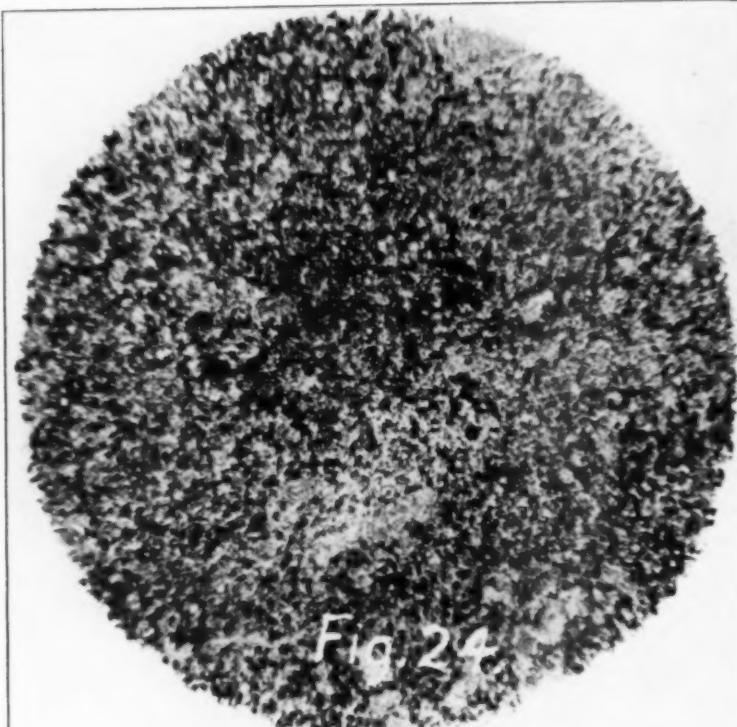


Fig. 24.

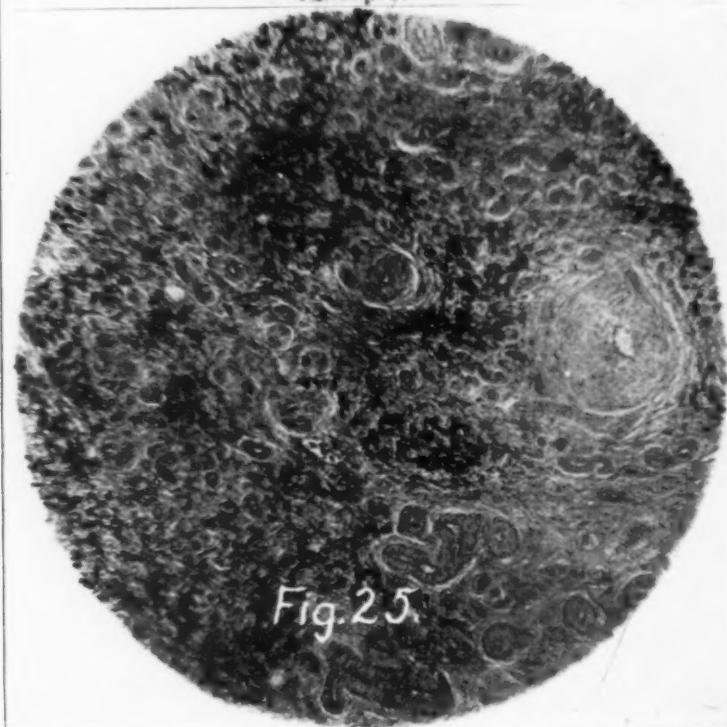


Fig. 25.

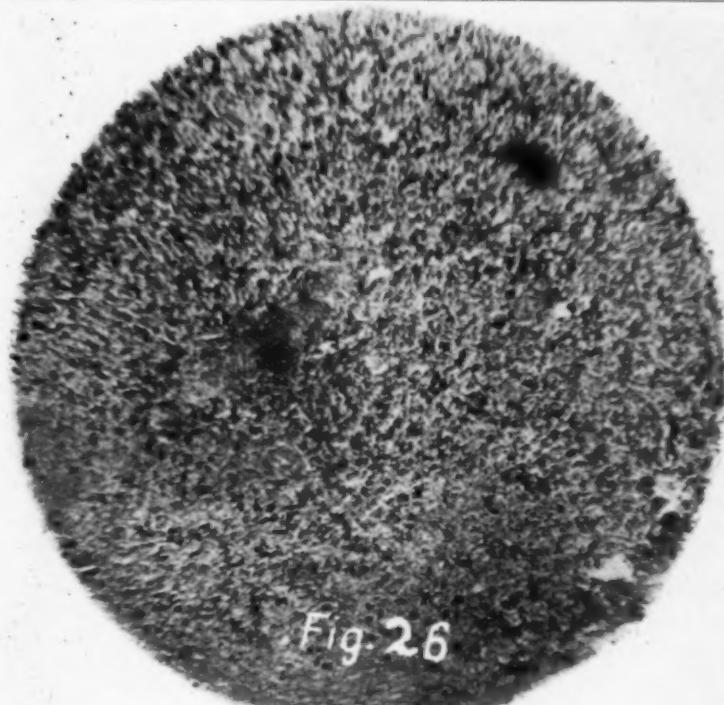


Fig. 26

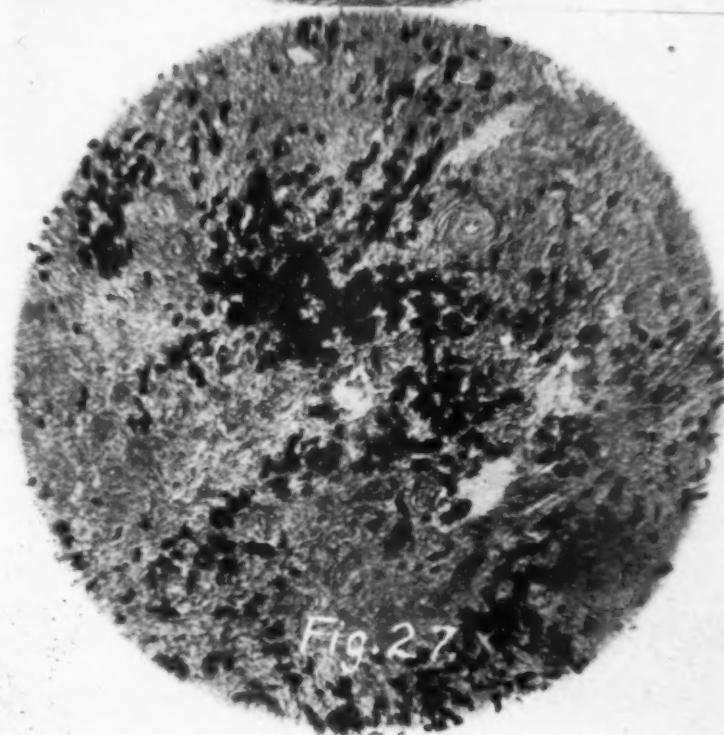


Fig. 27

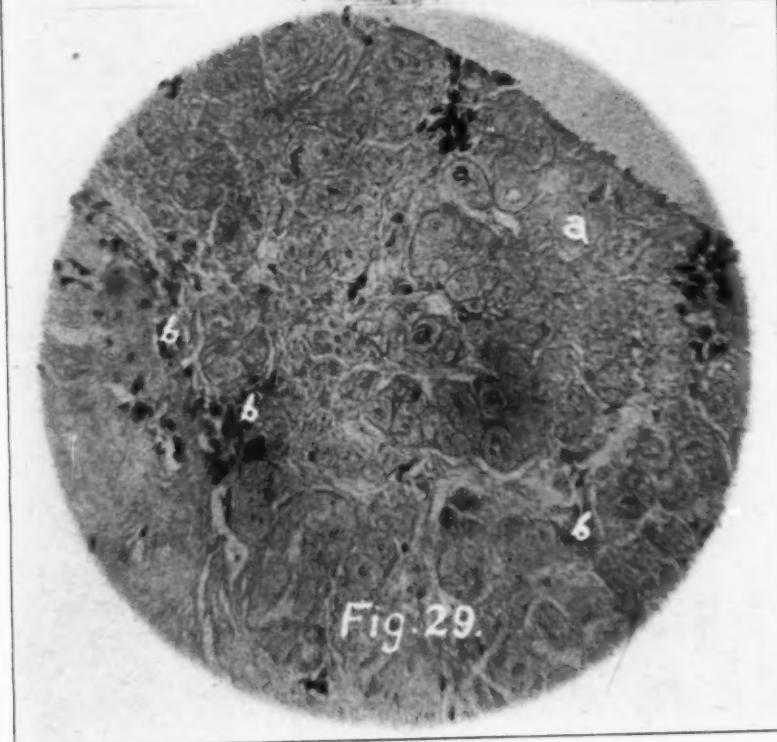
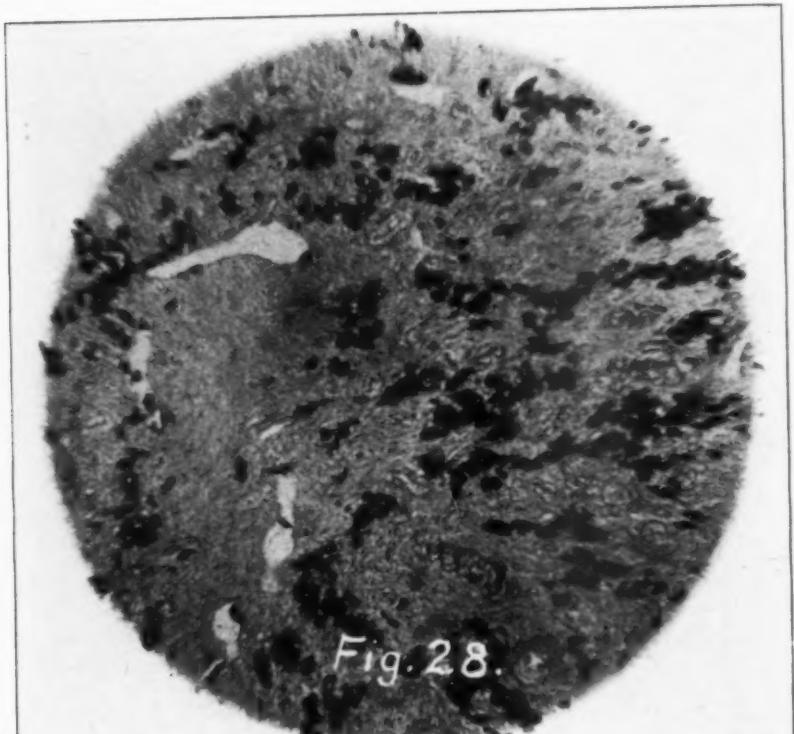




Fig 30

STUDIES OF THE ESTROUS OR GENITAL CYCLE OF THE OX

Second Paper¹

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Veterinarians are necessarily interested in biological progress, especially those phases giving us a clearer conception of the structure and physiological phenomena which furnish a foundation for diagnosis, for a better understanding of, and treatment for abnormal conditions.

Without intending to be so, we are unfortunately between two opposing forces which have said some careless things on the clinical side and have made a sorry mess on the anatomical side, as published recently in the JOURNAL OF THE A. V. M. A. We started this work originally, some years ago, to gain anatomical facts which we believed would be of benefit to the clinician and the further we delve the more sure we are of our position. We are presenting our observations and assuming the privilege of drawing some conclusions. We ask those who disagree with us only to study the available literature, recapitulate our observations on carefully selected and timed material, or avail themselves of the opportunity to examine our material, before questioning the accuracy of our observations. We might have presented less at this meeting and more next year, but we thought that the facts might stop the useless bickerings and assumptions regarding some points on the anatomy and physiology of the genital organs of the cow.

Our progress is dependent largely on methodology and our ability to use the progress being made in physics, chemistry and laboratory technique, together with the ability to observe, chronicle and deduce. In the problems before us we have drawn from all available sources and hereby make acknowledgment of our indebtedness to the other research workers in this field, particularly the Americans.

Many observations have been made on living individuals. Every possible precaution has been taken to procure healthy animals, of known history, from clean herds. These have been kept under observation from a few days to three years. We have

¹Presented at the sixtieth annual meeting of the American Veterinary Medical Association, Montreal, Canada, August 27-31, 1923.

studied the literature carefully and will give only a few of the references, as unfortunately *much of the recorded work is valueless because of the lack of a definite outline in planning and execution, particularly with a lack of the time element.* Several Americans have done monumental, fundamental, methodical investigations on the estrous cycle in the rat, guinea pig, mouse, chicken, pig and opossum. The best work in this field has been done by Americans.

METHODS

1. Glass-speculum method of direct observation, together with note-taking, which was demonstrated by Dr. Bemis, at the 1922 meeting in St. Louis.*

2. Smear Methods:

- a. From vestibule only
- b. From vulva, vestibule, bulb, vagina, cervix.

The smears were made by using a small, glass rod which was inserted through the speculum and lightly touched on the epithelium. At first smears were made direct, later a drop of physiological salt solution was placed on slide, then the end of the rod was washed in this. In either case the smear was dried and fixed at once by heat, then stained. After trying various staining methods, hematoxylkn and eosin proved the most satisfactory for routine examinations.

3. Macroscopic examination of the entire genital tract, on postmortem, at butchering:

- a. Ovaries are examined, blocks taken for microscopic examination. Detailed methods are given in Dr. McNutt's paper.†
- b. Beginning at the vulva, the tract is opened dorsally, step by step as examined and described, then fixed in 10% formalin for 12 to 24 hours and blocks taken for microscopic examination.

4. Microscopic study of serial and other sections.

There is no fixed anatomical state or condition for any portion of the genitalia; instead, constant changes, cyclic in character, are occurring. The are constructive, involutionary or secretory, in character. Some are yet to be interpreted. Even in diestrus constant structural changes are taking place daily. The macroscopic changes are as distinct and striking as the microscopic.

Many of the normal phenomena seen in the ox have already

*Abstract of first paper, Jour. Amer. Vet. Med. Asso., lxii, n. s. 15 (1923), 4, pp. 536-7.
†p. 556.

been described as pathological conditions on account of the fact that the normal cellular changes, infiltrations and desquamations strikingly resemble pathological processes occurring elsewhere in the body. The histological pathology of the female genitalia of the domestic animals is yet to be built.

Formalin-hardened, dissecting-room material is worthless, due to the unequal contraction of the different tissues, which distorts the relative size, increases the density and destroys the color, things very essential to the clinician and pathologist.

The connective tissue of the body and horns of the uterus is essentially embryonic. The first or inner zone, which is just under the epithelium, consists of fibroblasts embedded in a semifluid intercellular substance. The second zone contains spindle to stellate connective tissue cells of embryonic type. The third or outer zone is essentially the same until after puberty and pregnancy, when it gradually assumes a fibrous character. The embryonic character is apparent on the gross specimen, which is gelatinous, very much like the umbilical cord of the new born. Under the cotyledons there is a remarkable vascular zone between the first and second zones, as outlined above, which we cannot fully describe until its embryology is completed.

Undoubtedly all of the cyclic changes are purposeful and have in part an evolutionary explanation yet to be studied. Physiological phenomena go hand in hand with these anatomical changes but the interdependability, cause and effect are not yet fully understood. We believe many of them to be inherent with only an evolutionary explanation. Many correlationary facts are known but the literature is filled with vague facts and explanations made out of fancy. The latest of these to hit veterinarians has an euphonious, synergistic ring and, with Prof. W. L. Williams, I wish to suggest that veterinarians interested in endocrine therapy read standard texts on endocrinology, especially before attempting to change the results of a million years of evolutionary heredity, as expressed in the phenomena of the estrous cycle.

At present we believe, with many other workers, that the phenomena seen in the estrous cycle, those occurring at the same time or succeeding each other in a rhythmical manner, are to be interpreted as a freshening and a preparation for a fruitful coitus, and an initiation of the changes necessary for a successful conception, attachment and nourishment of the embryo. The causes underlying these phenomena are still unknown in spite

of all the brilliant experimental work that has been done to elucidate the matter. However, as pointed out by several workers, there is a time correlation between the terminal growth and development of the Graafian follicle and the heat phenomena, congestion, edema, desquamation and cellular migration. (We include the above under B. Estrum). Also a time correlation between the developing corpus luteum of pregnancy and the continuation of the constructive phenomena seen in the body and horns of the uterus as a preparation for the attachment and nutrition of the embryo. Certainly also the latter depend on the presence, in the uterus, of embryonic vesicles. Also, in some way, the corpus luteum probably prevents the onset of a new heat period, thus providing the necessary time for the recuperation of the uterus. The corpus luteum, by time correlation, may have something to do with the rhythmicity of the estrous cycle.

We believe Clark's work on the ovary gives a rational circulatory explanation which places the corpus luteum in a mechanical status of interfering with the circulation by its growth and presence. Clinicians know that, when retained, its expression is followed shortly by a heat period. *The supposed functions of both the developing Graafian follicle and the corpus luteum, however, do not explain the first heat period which ushers in puberty.*

Now we may repeat that the real underlying causes of the various phenomena of the estrous cycle are unknown. From macroscopic observations largely, we arbitrarily subdivided the cycle into two periods, diestrus and estrum, the latter being divided into proestrus, estrum or heat, and postestrus.* We now consider this a physiological, rather than an anatomical classification.

We will here describe briefly the microscopic structure found in a virgin heifer, one-year old (# 33, # 57—see figs.).

Vagina: Epithelium—thin; ten layers of cells. An occasional, clear, swollen, surface cell; four or five layers of thin, cornified, nucleated cells. Five layers of closely packed cells, with active, circular, granular nuclei or simple columnar (goblet) cells or again a mixture of these with the surface cells columnar. This is a non-papillated, thin, stratified, squamous epithelium, the anterior portion essentially a mucus-secreting membrane.

Mucosa—areolar connective tissue—felt-like, line of union with epithelium straight.

*Loc. cit.

Cervix: Primary and secondary foldings with a slight suggestion of beginning tertiary foldings.

Epithelium—simple columnar. Cells loaded (granular). An occasional pyknotic cell. Nuclei compressed laterally, rod-shaped and at right angles to basement membrane. A small amount of mucus in the lumen, at bottom of secondary crypts, where some of the cells were secreting.

Mucosa—loose areolar tissue of medium density.

Uterus: Epithelium—simple columnar, non-ciliated, medium height; nuclei granular, circular, laterally compressed into short rods. An occasional leucocyte in the epithelium.

Mucosa—(zones as previously described).

Intercotyledonary:

First zone—cells scattered, are fibroblasts, leucocytes and phagocytes. Latter resemble a large mononuclear leucocyte, endoplasm lighter, nucleus often small and eccentric, as in plasma cells (Burnett). We have observed these phagocytes filled with hematogenous pigment, hence the name.

Second zone—pinkish cast, cells closely packed, many blood vessels, gland crypts here.

Third zone—very similar to first, wide gland ducts.

Cotyledonary:

First zone—fibroblasts closely packed.

Second zone—vascular, narrow, compact, developing capillaries often adjacent to each other.

Third zone—arterioles larger, blood vessels, fibroblasts separated from each other by narrow spaces.

Fourth zone—gland tubules and an occasional crypt in section; cells as in third zone. Occasional leucocytes and phagocytes throughout.

Uterine Tube:

(Ovarian end.) Epithelium—tall columnar to pseudo-stratified; nuclei active, granular and laterally compressed. Some pyknotic cells. Some extruding cells, cone-shaped, with the apex partly attached between the lumen ends of the fixed cells, the remainder being in the lumen. Often only the nucleus is seen; again the nucleus is seen to be surrounded by endoplasm. Some of these extruded cells and a few leucocytes in the lumen. Some secretion material at the free ends of the cells simulating cilia or in globular form, often a light lemon-yellow. (We doubt whether the cilia-like structures are true cilia, as they may be absent at proestrus.) That secretion globules are formed here we are

certain; they have been found in the uterus in other specimens.

Beginning at the middle of the cycle (# 31—see figs., 10½ days, 0 marking the onset of the external signs of estrus or heat proper):

Vestibule (vulva): Shows papillated mucosa, medium height, non-cornified epithelium. A few leucocytes, surface cells squamous. Later a surface layer of clear swollen cells develops with increasing cornification up to the 18th day, when it has reached a maximum thickness. At this time the surface layer is composed of thin, non-nucleated plates, beginning to desquamate. By the 20th day (# 46—see figs.) desquamation may reach to the germinal layer. This time is also marked by a heavy leucocytic infiltration of the epithelium and adjacent mucosa, with edema and congestion of the latter, which reaches its maximum 24 hours after the onset of heat manifestations (# 52—see figs.). Immediately following the complete desquamation the epithelium proliferates very rapidly, proliferation, cornification and desquamation continuing up to the fifth day, or even to the eighth. By the tenth day the heavy leucocytic infiltration has disappeared and the epithelium presents again the picture described for the 10½-day period.

Vagina: The maximum thickness of the epithelium is seen in the virgin. It is only 2 to 4 cells thick, in the middle of the cycle (# 31), and remains this way until the sixteenth day, then it thickens until the eighteenth day. After the eighteenth day, desquamation begins and we find occasional leucocytes in the epithelium and many leucocytes in the mucosa. While the epithelium increases in thickness remarkable cell changes are shown. There is a distinct surface cornification, beneath which are clear swollen cells, then the compact, multiplying germinal layer.

The desquamation is complete in 24 to 36 hours following onset of heat (# 52). On the twentieth day lymph flows from the mucosa through spaces in the epithelium. From the nineteenth to the third day the leucocytic migration and infiltration is very heavy and then passes rapidly into a quiescent state. Congestion and edema are also marked. In one case only (# 37) have we found a quickly rebuilt epithelial layer. At the middle of the cycle the mucosa is compact and folded.

Cervix:

Epithelium. We do not find the "loaded state" of the virgin until about the 16th to 18th day. From the middle of the

cycle (# 31) until that time the cells are exhausted or low and are gradually filling; however, a small amount of mucus is found even in the quiescent part of the cycle. Pyknotic cells in varying numbers are also found throughout the cycle.

The typical loaded and secreting cell is high columnar, granular and has a circular or laterally compressed granular nucleus. Goblet cells occur infrequently and practically always flanked by pyknotic cells. The maximum height of the loaded state occurs about the 17th or 18th day.

Marked congestion and edema is shown on the 19th day, and on this or the following day active secretion begins. Marked folding reaching a tertiary form shows at this time and persists to the second, third, or even the fourth day of the cycle. While the secretion is general it is most marked at first on the tips of the primary and secondary folds. Here the cells are reduced to a low cuboidal or may even desquamate the nuclei after the cell is exhausted. An exhaustion stage goes gradually down the sides of the folds and reaches the bottoms of the crypts by the fourteenth day. (In only one case (# 36) at 4 days, 8 hours, was there any marked desquamation exposing the mucosa; macroscopically this cervix appeared normal.) In all cases a few actively secreting cells were found in the bottoms of the crypts. No marked leucocytic infiltration occurs. A few leucocytes are found adjacent to and later passing through the epithelium from the sixteenth day on to the fifth day; very few are found after this time.

Uterus: Body and horns (no essential difference). The changes in height and the pseudo-stratified form often seen we believe to be fully explained by the changes occurring in the volume of the mucosa and the resulting multiplication seen following the onset of congestion and edema which brings an increased nutrition. Frequently the apparent stratification is due to oblique cutting of the sections.

Toward the end of diestrus (# 47) the cells are tall columnar with granular endoplasm, circular, granular nuclei in two or three strata (pseudo-stratified), no leucocytes within the epithelium, one occasionally at the basal end. Vacuolar changes in the epithelium gradually increase from the twentieth day until the fourth day, when this change is at its maximum.

Mucosa, as described for virgin in # 33 and # 57; quite a few phagocytes. On the eighteenth or nineteenth day distention of the blood capillaries with edema and leucocytic infiltration

begins, the maximum being reached on the 3rd to 5th day, when vascular phenomena gradually subside until the end of diestrus.

At the end of the first day (# 52) the intercellular material of the first zone stains a decided pink with eosin, which shows a marked contrast in the second zone under the cotyledon which is blue, due to the many closely-packed, blue-staining nuclei. The leucocytic infiltration which begins about the nineteenth day and reaches its maximum on about the fifth day gradually subsides until the fourteenth day; it is mostly polymorpho-nuclear, but many mononuclears of both types are also present. The remarkable infiltration is that of the eosinophiles. We have found none between the sixteenth day and the onset of heat. From the onset of heat until the fourteenth day they are present and have the following peculiar distribution. At the onset a few are found in the first zone; at the end of 12 hours they are found also in both the second and third zones in large numbers, gradually decreasing from the fifth to the fourteenth day. On the eighth day they are packed in the first zone next to the epithelium and around the gland crypts. On the fourteenth day they are packed around the blood vessels; whether future observations will find this peculiar distribution remains to be seen. The petechia proved to be between the epithelium and mucosa or imbedded in the first zone of the mucosa; the epithelium may be loosened and desquamate over the cotyledons (# 52), setting the blood free into the lumen of the uterus.

Uterine tube: At the middle of the cycle, about as described for the virgin, leucocytic infiltration is slight. Congestion, edema and the peculiar epithelial cell desquamation is marked from the sixteenth day on, eosinophiles come later, and last only three or four days.

ACKNOWLEDGMENT

We are indebted to our colleagues, particularly to Drs. G. W. McNutt and B. A. Zupp, for aid in daily observations and collection of the material used in this paper.

Grateful acknowledgement is made to Dean C. H. Stange for suggestions in outlining and encouragement in the execution of the project, and particularly for setting aside funds, from the Practitioners' Course Fund and the Research Department Fund, to defray the necessary expense incurred.

Illustrations are microphotographs (x 120). For a detailed history of most of the cases used in this study see paper by McNutt, in this JOURNAL.*

*p. 556.

DATA ON ANIMALS REFERRED TO IN DESCRIPTION OF FIGURES¹

31. 10½ days, diestrus. Red, grade heifer, under observation several months, used for vestibular smears only. Macroscopic appearance:
 Vestibule: yellowish dull; gelatinous surface.
 Vagina: hillock folding; anterior part covered by a slightly-clouded, gummy mucus.
 Cervix: showed one and one-half low folds protruding into the vagina; canal very tortuous, due to five transverse hillocks of the mucous membrane; longitudinal folds low.
 Body and horns: mucous membrane, light-yellowish cast; only two intercotyledonary petechiae found; cotyledons, umbilicated, as though they had receded, leaving an encircling ring of intercotyledonary mucous membrane.
 Uterine tube: 1.5 mm. in middle, 5 mm. at ovarian end.
46. 20 days, proestrus. Grade Jersey. Macroscopic appearance (postmortem):
 Vestibule: well marked lymph vessels and vesicles; a few petechiae.
 Vagina: contained a small amount of clear mucus; a few petechiae present.
 Cervix: light-reddish cast and "weeping" mucus.
 Body and horns: slightly edematous, straw-colored, gelatinous; longitudinal folds, marked; transverse folds, not very distinct; so not markedly hillock; cotyledons, light-reddish cast; some intercotyledonary areas also of a light-reddish cast.
52. 36 hours. Heifer, under observation several months, ovulated at 30 hours. Determined by rectal palpation (postmortem):
 Vestibule: yellow, gelatinous; very few lymph vessels visible; small blood vessels distended and visible through epithelium.
 Vagina: contained a large amount of bloody mucus.
 Cervix: one and one-fourth folds protruding into vagina; three hillocks protruding into lumen.
 Uterus: erect, distended; body and first part of horns studded with sub-peritoneal petechiae; large amount of clotted blood in lumen; petechiae in intercotyledonary areas; cotyledons red, covered by clotted blood. (This is the most extreme case of bleeding yet observed by us and confirms the belief that bleeding in the ox is cotyledonary. We are still undecided as to whether or not bleeding is an essential part of estrous phenomena in the ox, i. e., whether it is necessary for conception.)

Nos. 33 and 57 were virgin heifers. No. 33 was a grade Holstein, one year old. Tubular part of genitalia "infantile." Very little mucus in vagina; ovaries, medium in size and entire surface studded with small follicles, 3-4 mm. Serial sections showed no corpora lutea. No. 57 was an eight-weeks-old veal calf.

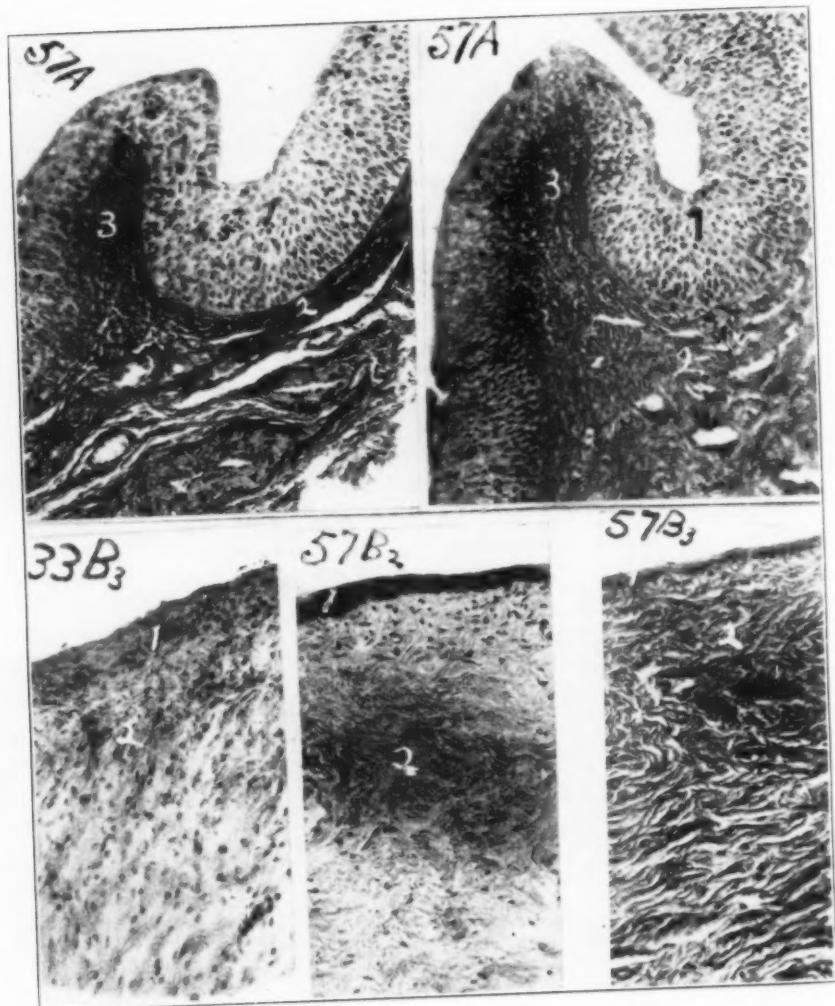
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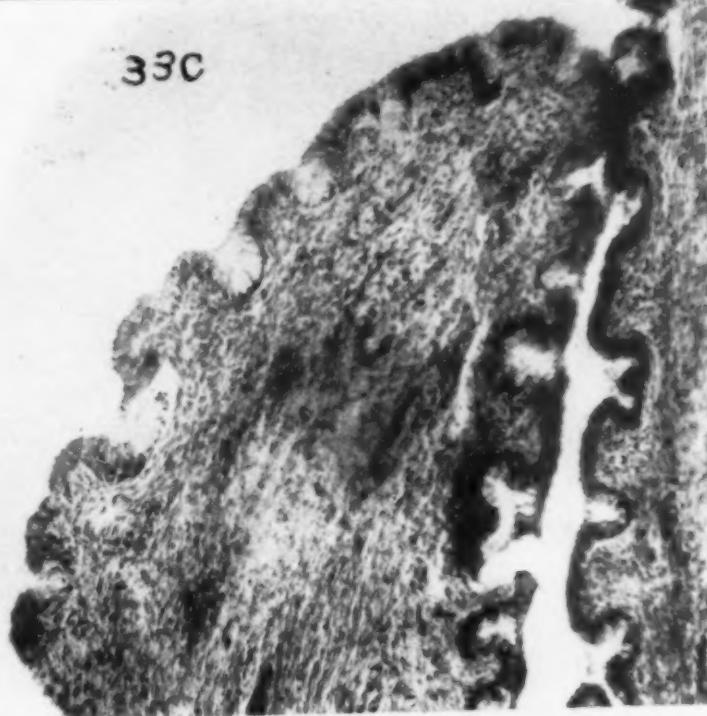
*Incomplete. Many other papers in the bibliographies of these titles have been examined.

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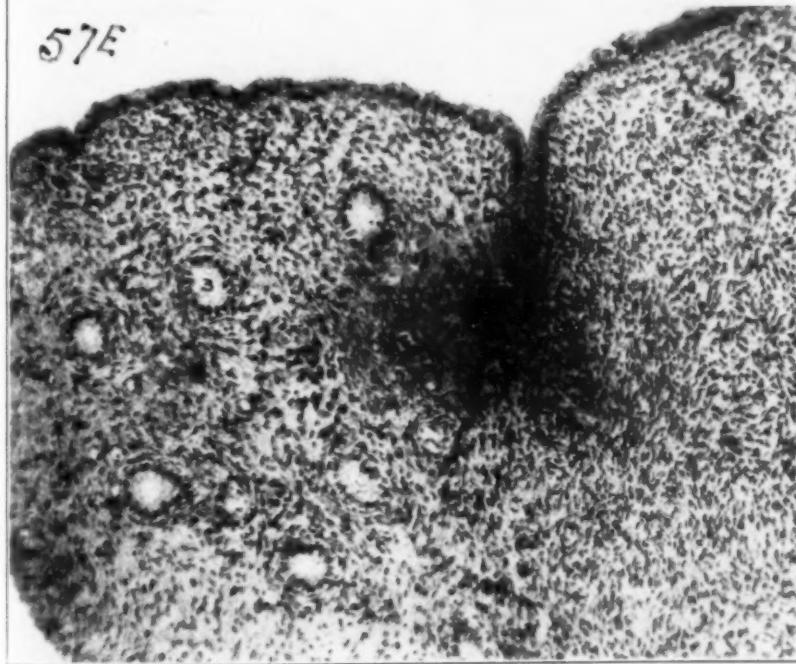
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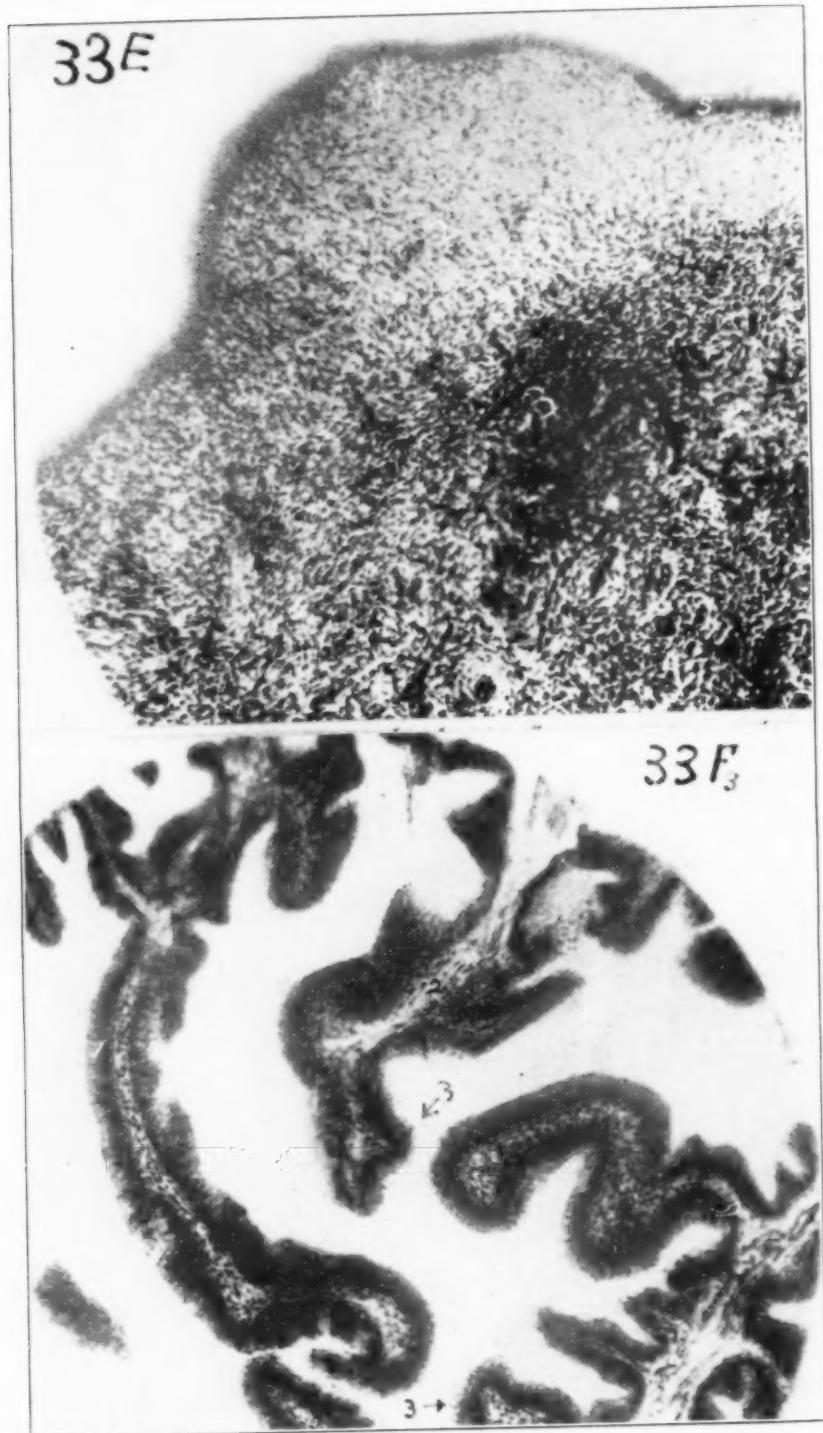


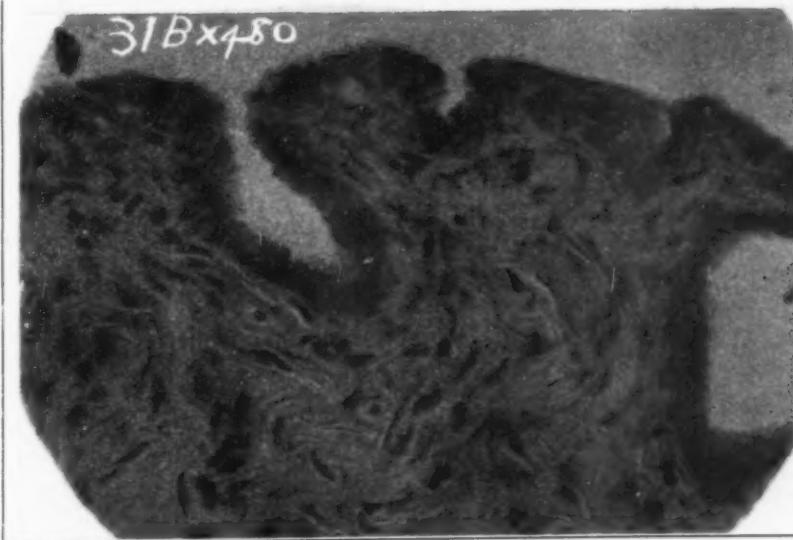
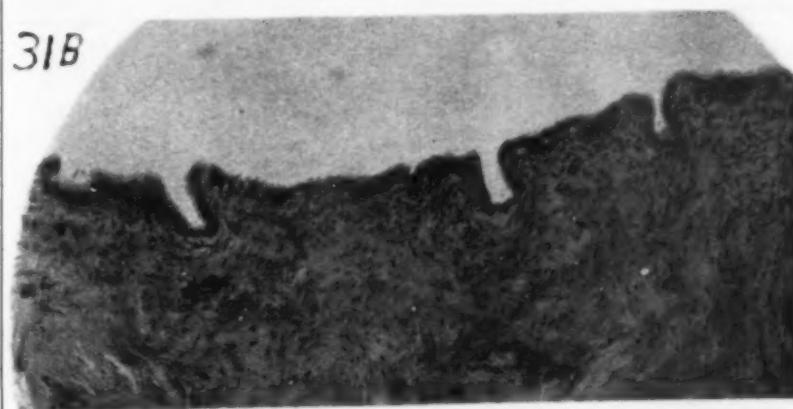
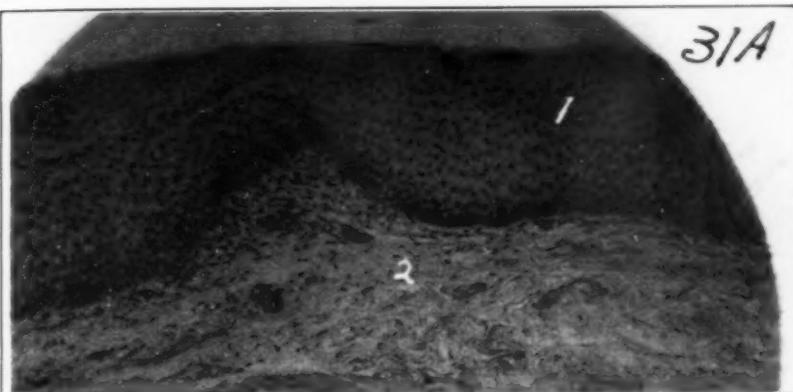
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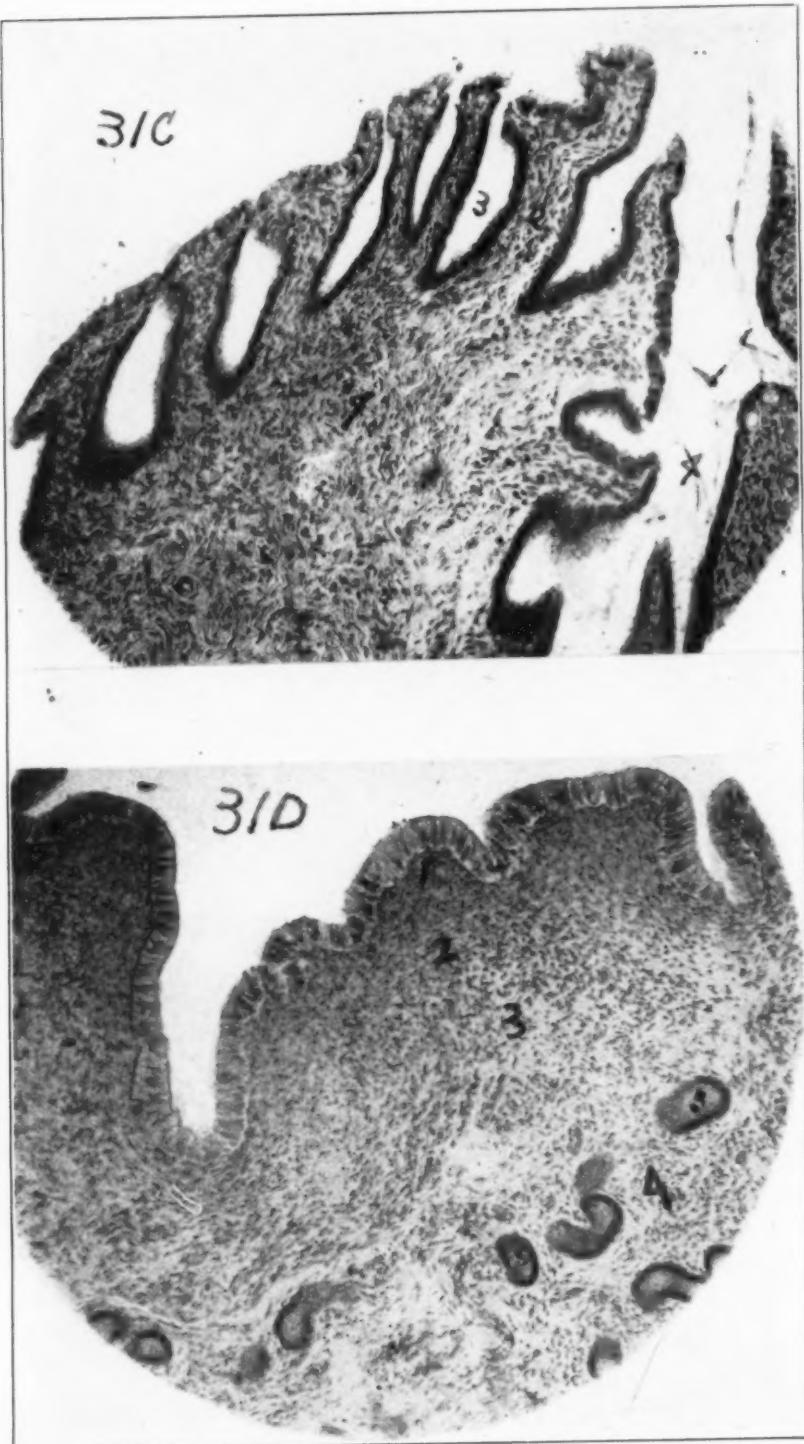


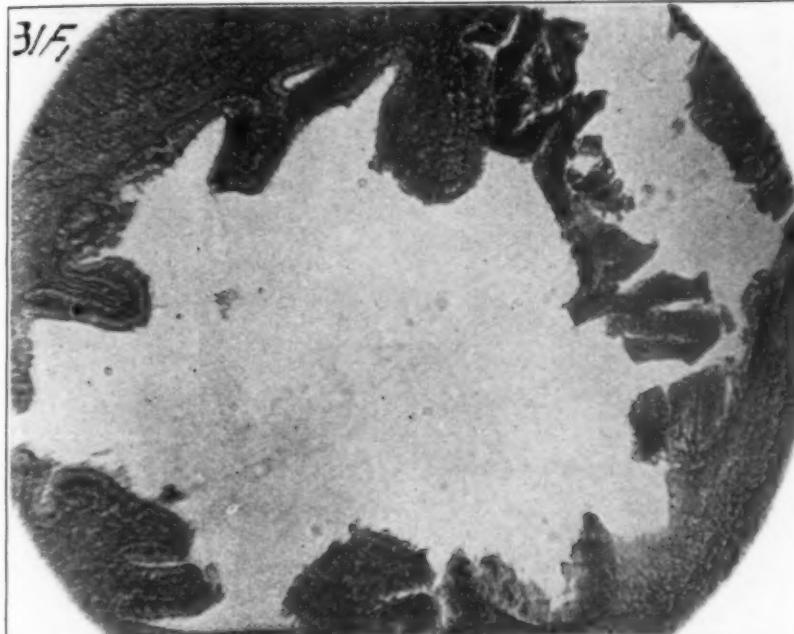
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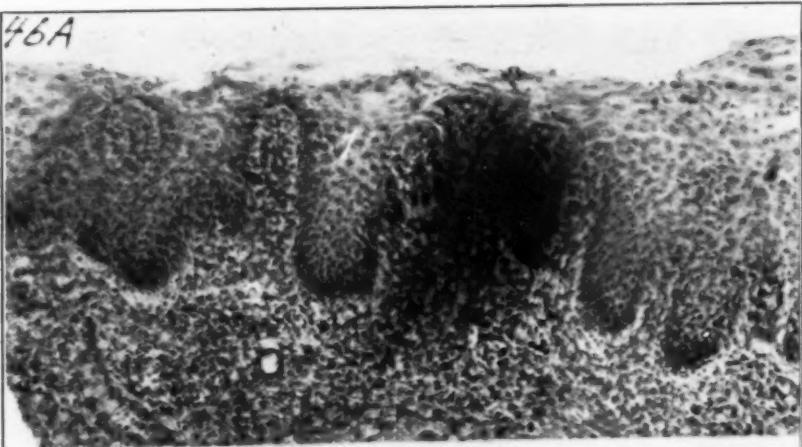
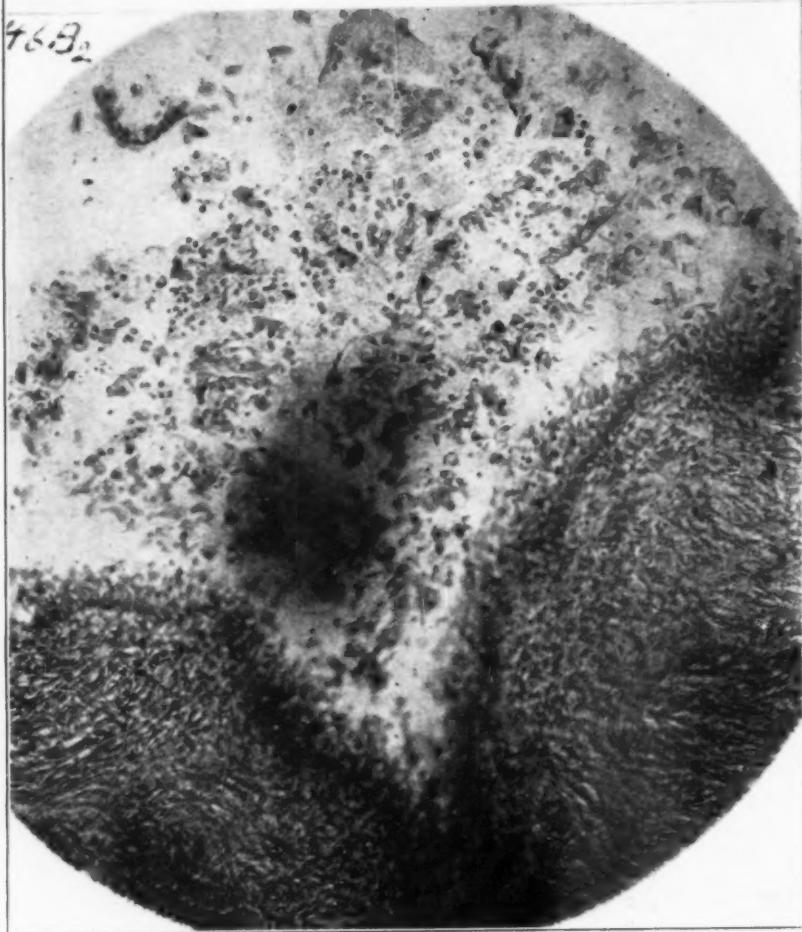


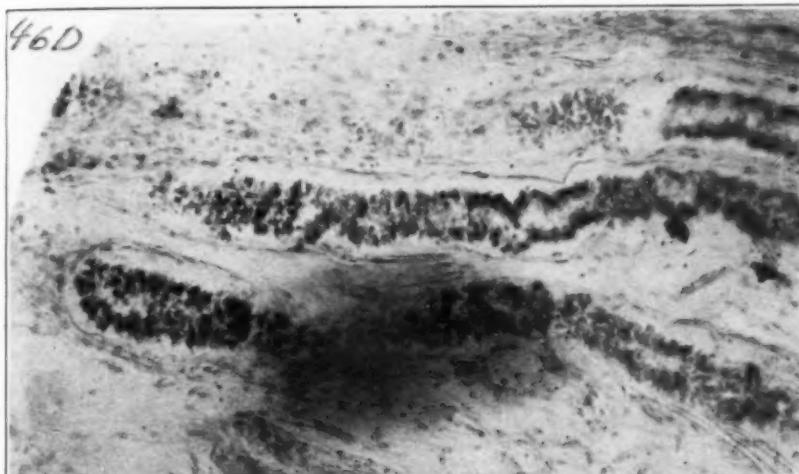


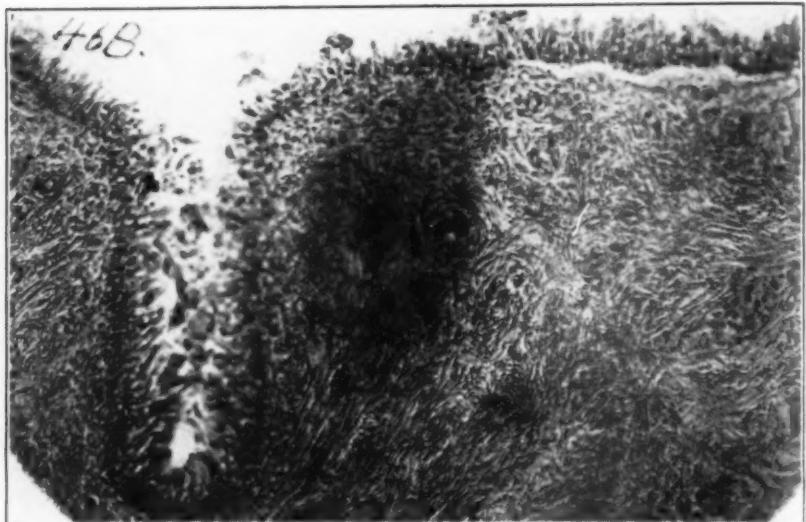




46A

46B₂

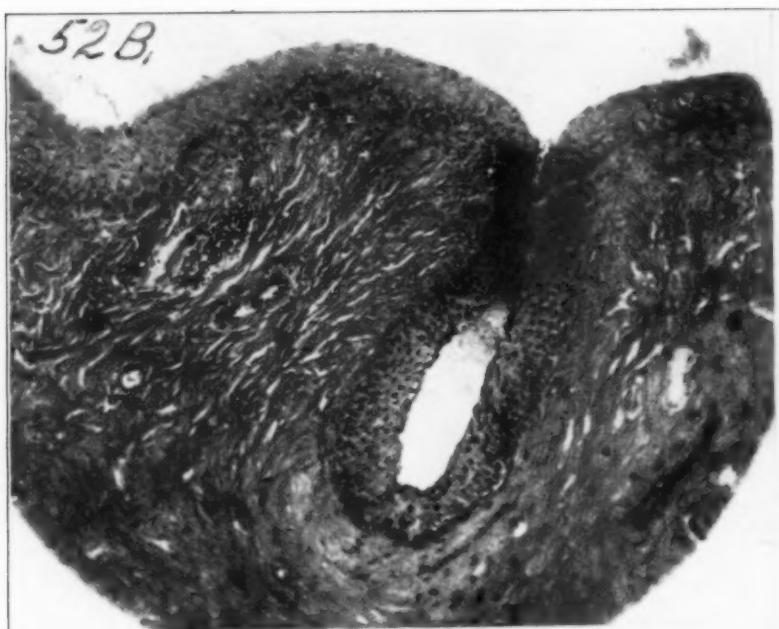




46F₃

52A

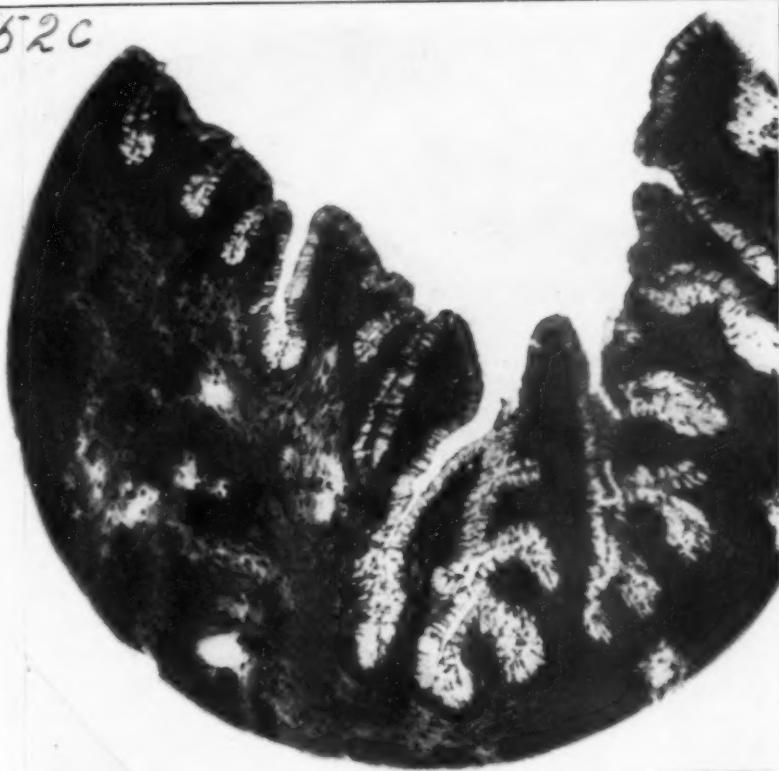




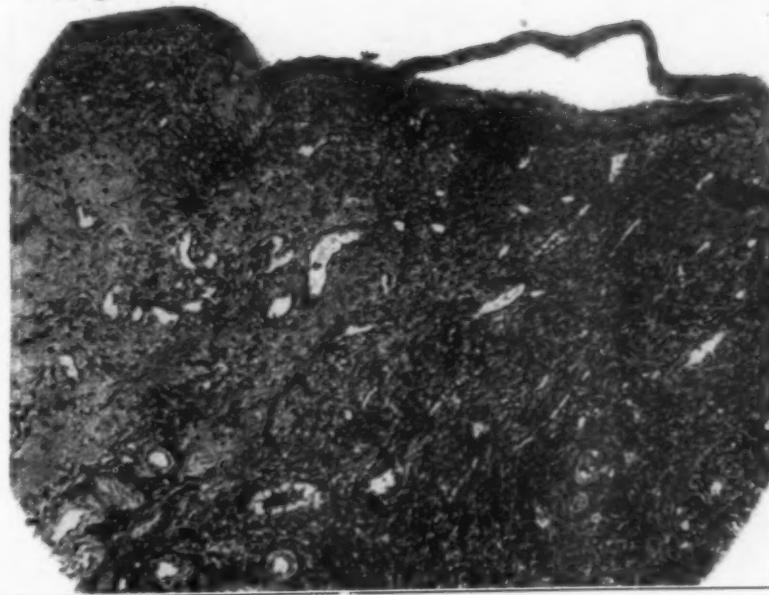
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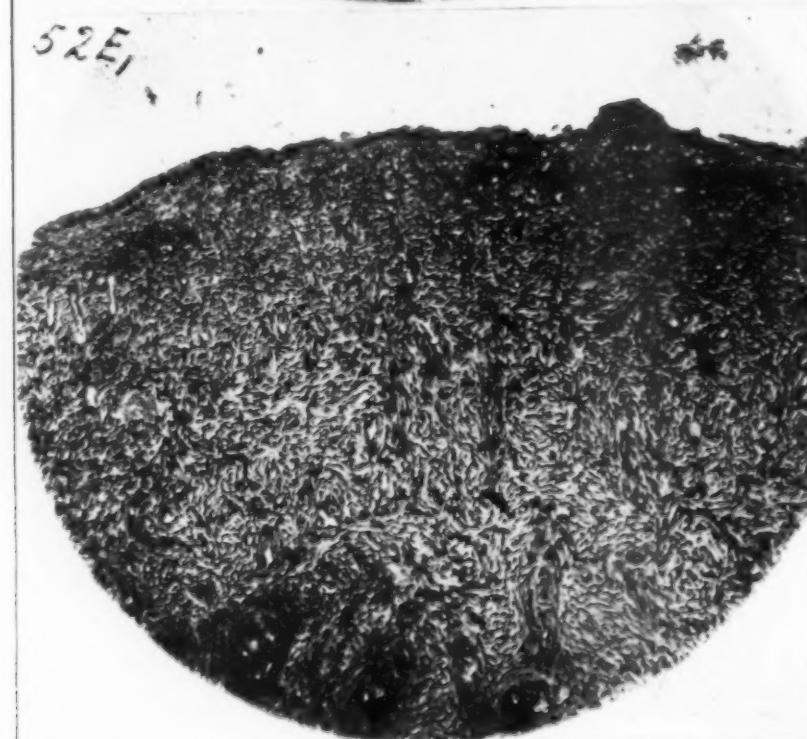
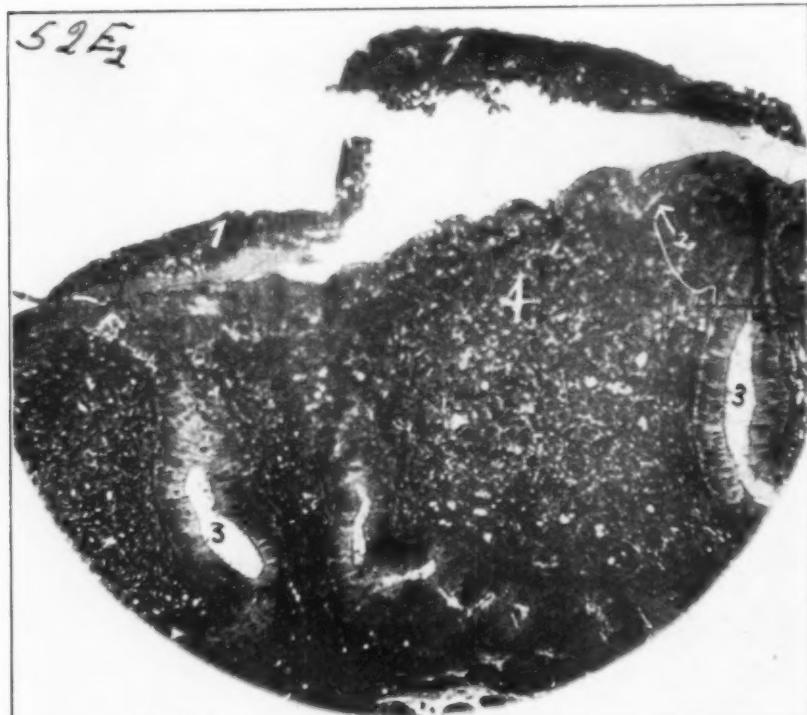


52C



52D







OCCURRENCE OF NODULAR TYPHLITIS IN PHEASANTS DUE TO HETERAKIS ISOLONCHE IN NORTH AMERICA

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INTRODUCTION

The object of this paper is to call attention to the existence, in North America, of what appears to be a fatal parasitic disease of pheasants. Although this disease was first noted over thirty years ago, in Germany and France, and has subsequently been found in other localities, its occurrence in North America has only recently come to light.

In the past considerable confusion existed with regard to the specific identity of the parasite responsible for nodular disease of pheasants, and although this confusion was cleared up several years ago by Luet and Henry (1911), text-books and other sources of information still contain erroneous statements concerning the specific identity of the parasite involved. Information recently obtained in seven cases originating in three different localities has shown that the agent responsible for nodular typhilitis of pheasants in North America is a species of heterakid (*Heterakis isolonche*) not known to occur in chickens or other domestic birds, its hosts, so far as our present knowledge goes, being limited to various species of pheasants, thus confirming the conclusions of Luet and Henry with reference to the etiology of this disease.

CASES FROM THE UNITED STATES AND CANADA

The first case originated in Pennsylvania and came to my attention through the courtesy of Dr. B. H. Ransom, Chief of the Zoological Division of this Bureau. The material in question, which consisted of a portion of cecum from a pheasant (species not given), was forwarded to the Zoological Division by Dr. Fred. Boerner, of the Pennsylvania State Bureau of Animal Industry, with the information that the pheasant had been necropsied to determine the cause of death and that no lesions other than the condition of the ceca, which contained numerous

Received for publication, March 26, 1924.

nodules, were found. Dr. Boerner noted that the cecal nodules contained worms, a single worm being found in each nodule.

Examination of the cecal material showed it to be riddled with nodules, each nodule containing a single specimen apparently fully grown but sexually immature, both sexes being present. These parasites were determined as *Heterakis isolonche*.

A second case of the occurrence of this parasite in cecal nodules in a pheasant originated in Canada and came to the attention of this laboratory through Dr. F. W. Schofield, of the Ontario Veterinary College, who forwarded a portion of a cecum of a pheasant (species not given), requesting information concerning the identity of the parasites in the nodules. Examination of specimens extracted from nodules showed that both sexes, apparently fully grown, but not yet sexually mature, were represented. The worms were found to be *Heterakis isolonche*.

Our additional cases originated in Darien, Connecticut, and consisted of five pheasants (*Chrysorochus pictus*) which had died and which were forwarded by a bird fancier to the Bureau of Biological Survey. These birds were referred to this laboratory for postmortem examination and the following observations were made:

All birds showed cecal nodules, similar to those referred to in the first two cases. One bird showed, moreover, pronounced lesions of tuberculosis, diagnosed and confirmed bacteriologically by Dr. L. T. Giltner, of the Pathological Division of this Bureau. Smears from two of the four birds that showed no lesions other than cecal nodules were made, with negative bacteriological results. In addition to nodular worms, three birds which were examined for intestinal parasites were found to harbor heterakids in the lumina of the ceca. These worms were found to be *Heterakis gallinae*, whereas the worms extracted from the nodules, among which were found sexually mature specimens including gravid females as well as immature specimens, were found to be *Heterakis isolonche*. In view of the past confusion regarding the specific identity of the heterakid responsible for nodular disease of pheasants, it is important to note that both species may occur in the same host animal and that the lumen-inhabiting forms are *Heterakis gallinae*, whereas the nodular worms are *Heterakis isolonche*.*

*A number of males from the lumen were examined and found to be *Heterakis gallinae*. Lucet and Henry (1911) state, however, that they have found sexually mature specimens of *Heterakis isolonche* in the lumen of the cecum of a pheasant.

HISTORY OF THE DISCOVERY OF NODULAR TYPHLITIS OF PHEASANTS

According to Lucet and Henry (1911), the first record of the occurrence of nodules of parasitic origin in pheasants was reported by Klee, in 1891, in Germany, the nodules having been found in *Phasianus colchicus*. In the following year Railliet (1892) noted this condition in a golden pheasant (*Thaumalea picta*) (= *Chryso-rochus pictus*), in France, and described it as verrucous typhlitis. Subsequently to these earliest records, the disease has been reported from various species of pheasants by Galli-Valerio (1896), Klee (1897), Letulle and Marotel (1901), Sambon (1908), and Lucet and Henry (1911).

HETERAKIS ISOLONCHE THE CASUAL AGENT OF NODULAR TYPHLITIS OF PHEASANTS

Prior to the work of Lucet and Henry (1911) it had been accepted as an established fact that *Heterakis gallinae* (= *H. papillosa*), a nematode of common occurrence in various birds, including chickens and other domestic birds, was responsible for nodules in the ceca of pheasants. Lucet and Henry (1911) found that in the cases that came to their attention the worms were not *Heterakis gallinae* (also known as *Heterakis palillosa* and *Heterakis vesicularis*), but a species of heterakid (*Heterakis isolonche*) described by von Linstow, in 1906, from the cecum of a pheasant (*Thaumalea amherstiae*). Curiously enough, von Linstow attached no medical importance to these parasites and did not even mention their occurrence in nodules. Lucet and Henry also re-examined the material which formed the bases of the reports of Railliet and Lucet (1892), of Letulle and Marotel (1901), and of Sambon (1908), and found that the heterakids involved were not *Heterakis gallinae*, but *Heterakis isolonche*.

While these two species of heterakids can not be distinguished on the basis of size and shape, they may be readily distinguished microscopically in the male by the size of the spicules, and in the female by the presence or absence of papillae in the region of the vulva. In *Heterakis gallinae* the spicules are dissimilar in size, the longer spicule measuring in excess of two millimeters and the shorter spicule measuring only about 0.65 mm, whereas in *Heterakis isolonche* the two spicules are equal in length and measure, according to von Linstow (1906), 1.4 mm and, according to Lucet and Henry (1911), 1.4 to 1.75 mm (fig. I). According to my observations, which are based upon immature and mature

specimens, the range of variation is from 1.2 mm to 1.45 mm. In *Heterakis gallinae* there are no papillae in the region of the vulva, whereas in *Heterakis isolonche* there are from 2 to 3 papillae behind the vulva, according to von Linstow (1906), and from

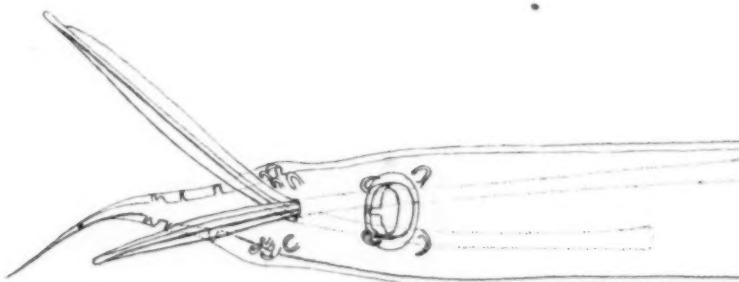


Fig. 1. Posterior portion of male (*Heterakis isolonche*) showing the spicules, the preanal sucker and the arrangement of the papillae. (From Lucet and Henry, 1911.)

2 to 3 papillae behind the vulva and occasionally 1 papilla in front of the vulva, according to Lucet and Henry (1911). In one case I found 4 papillae behind the vulva.

PROBABLE LIFE HISTORY OF HETERAKIS ISOLONCHE

The life history of *Heterakis isolonche* has not been investigated in a systematic way, and our knowledge of this subject is based entirely on the records of the various forms found in nodules.

That early-stage larvae penetrate the cecal mucosa is evident from available information. Thus Letulle and Marotel (1901) describe larval forms, 1.5 mm to 4 mm long by 100 to 325 microns wide, with a characteristic larval morphology (fig. II).



Fig. II. Larva of (*Heterakis isolonche*) extracted from a nodule. Enlarged 14 times. (From Letulle and Marotel, 1901.)

The question raised by Lucet and Henry (1911) as to whether the larval forms enter the nodules and attain their development in them, or whether the larval forms develop in the lumina of the ceca and burrow into the mucosa as adults, must, in the light of the findings of early larval forms in nodules, be answered in only one way. Moreover, I have found various stages of the worm in nodules, including apparently fully grown immature worms, mature worms and worms that were undergoing what

appeared to be the final molt, thus indicating that *Heterakis isolonche* attains its full development within the nodule.

Our present knowledge concerning the life history of heterakids is based largely on studies of the life history of *Heterakis gallinae*, a parasite of considerable pathogenic importance because of its relation to the transmission of blackhead. According to Graybill (1921), the larvae of *Heterakis gallinae* may be found in the wall of the cecum but do not become encysted there. Uribe (1922) finds that the newly hatched larvae of *Heterakis gallinae* migrate into the cecal glands, where they remain, from the second to the fifth day after feeding ripe embryonated eggs to chicks. After the fifth day the larvae leave the crypts of the cecal mucosa and continue their development in the lumen. Although



Fig. III. Photograph of two specimens of cecum of a golden pheasant (*Chrysolophus pictus*) showing nodules and of four worms (*Heterakis isolonche*) extracted from nodules. The specimen of cecum on the right shows the nodules through the mucous surface and the specimen of cecum on the left shows the nodules through the serous coat. The coiled worm is a male and the remaining worms are females. (Natural size)

these parasites, according to recent observations, show a tendency to push the anterior portion of the body into the cecal mucosa, they do not, so far as our present knowledge goes, penetrate the wall of the cecum.

In anticipation of experimental evidence concerning the life history of *Heterakis isolonche*, it may be predicted that, after hatching in the small intestine the larval worms migrate to the cecum, penetrate the cecal mucosa and continue to grow, the tissues of the ceca reacting by forming nodules which increase

in size as the worms grow larger and displace an increasing amount of tissue. It is also probable that the worms may ultimately leave the nodules and get into the lumen, adult forms having been found in the lumen by Luce and Henry (1911).

PATHOGENICITY OF HETERAKIS ISOLONCHE

That infestation with *Heterakis isolonche* is responsible for deaths of pheasants has been observed by various investigators who have reported this condition. Thus, Letulle and Marotel (1901) state that two pheasants that came under their observations succumbed to nodular typhlitis, one showing symptoms of anemia and the other showing epileptic symptoms. These writers believed that they were dealing with an abnormal mode of development of *Heterakis vesicularis* (=*Heterakis gallinae*). Luce and Henry (1911) also report the deaths of six pheasants from nodular typhlitis. In one case they describe a sudden onset of the disease with a rapid termination. They report a marked dilation of the ceca, which were riddled with nodules ranging in size from that of a pinhead to that of a pea, being isolated in certain portions and consisting of massive agglomerations in other portions. They note that the younger nodules are whitish-gray and translucent, whereas the older nodules are grayish and opaque. They further state that the duodenum and rectum present lesions similar to those of the ceca, but less extensive, the nodules being smaller. Three of the five pheasants from Connecticut, mentioned in an earlier paragraph, showed lesions like those described by Luce and Henry.

The histopathology of this disease was studied by Letulle and Marotel (1901, 1909), who find that the lesions are located in the submucosa, where the nodules may become so numerous and so confluent that comparatively little normal tissue is seen. These writers also found lesions in the muscular coat, but in this location the lesions were rare and smaller in size. They characterize young nodules as "vegetative," whereas they characterize the old nodules as fibrous, and between these extremes they find nodules that are partially "vegetative" and partially fibrous.

SUMMARY

The occurrence of nodular typhlitis in pheasants in the United States and Canada is reported for the first time, the disease being due to *Heterakis isolonche*, a species not yet known to occur in domestic birds. Published records attributing the cause of nodular typhlitis of pheasants to *Heterakis gallinae* are based on

faulty specific determinations, as already shown by Lucet and Henry.

Infestation with *Heterakis isolonche* is responsible for deaths of pheasants, as shown by the records presented in this paper and by the records published by other investigators. From the records of various stages of the parasite obtained from nodules it may be concluded that early-stage larvae penetrate the mucosa of the ceca and encyst in the submucosa, where they continue to grow and attain their sexual maturity.

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We Have Room For A Thousand New Members This Year.

The Board of Health of Indianapolis recently secured the passage of an ordinance providing that all milk and dairy products, offered for sale in the city, must come from tuberculin-tested cattle. The ordinance will go into effect January 1, 1926.

*These references were taken from Lucet and Henry (1911) and were not verified.

QUOTATIONS FROM LITERATURE ON BOVINE INFECTIOUS ABORTION SAID TO BE NOT CONVENIENTLY AVAILABLE

By GEORGE H. HART

University of California, Berkeley, Cal.

It has been stated that the literature of Bang and M'Fadyean and Stockman, covering the subject of vaccination with live abortion germs, as a possible means to be used in the control of abortion, is not conveniently available to one in five hundred American veterinary practitioners, and further, that our article on "Controlled Vaccination Experiments in Cattle with *Bact. abortum*" would inevitably mislead any one not conversant with the facts. I therefore wish to make this data easily available to all interested persons in this country by the following quotation from Professor Bang's article, "Infectious Abortion in Cattle," presented at the National Veterinary Association, Liverpool, July, 1906, and published in English in the *Journal of Comparative Pathology and Therapeutics*, Vol. 19, No. 3, September, 1906:

"The fact that abortion inflammation has a natural tendency to die out in a cow, after several abortions, leads us to believe that the aborting cow acquires a certain immunity. The degree of immunity is not a constant one, as some cows, luckily very few, continue to abort five times; and, although most cows only abort two and three following years, it sometimes happens that they abort again after one, two, or more normal parturitions. Notwithstanding this fact, which seems to prove that not every cow possesses the same power of producing antitoxic or antibacterial substances, it seemed to me to be a useful task to try to find out whether it was possible or not to confer immunity against abortion by means of introducing the specific bacillus or its products into the body of the animal before pregnancy.

"During the last three years we have made several experiments with cows and with sheep and goats. The first two years we tried to immunize by means of intravenous injections of living bacilli (pure culture in serum-bouillon) some time before copulation, and when the animal was pregnant we infected it either by feeding it with culture, or with parts of an aborted afterbirth, or by intravenous injection of culture. As might be expected, it is much easier to protect against infection by feeding than against infection by intravenous injection. Out of eight sheep which had injections into the jugular vein several times in the course of a year (six, six times; two, three times) with a serum-bouillon culture, four were fed with abortion bacilli, about 70 cc; four injected intravenously, 100 cc. The first all bore their lambs to the full term, the latter all aborted. As infection under natural circumstances must correspond more to a feeding experiment than to an intravenous injection, we limited ourselves in the future to the first way of infection in order to control the degree of immunity we had conferred.

"In the year 1903-04 four heifers and one cow were injected once (one) or twice (four) into the jugular vein with 10 cc. of a serum-bouillon culture. Having conceived, they were fed, four with culture (70 cc.) and one with exudate. Three carried their calves to full term, but two aborted. One unvaccinated heifer aborted three-and-a-half months after feeding.

"This result does not seem to be good, but on closer examination we find that the two vaccinated animals that aborted received the intravenous injection a rather short time before the copulation—sixteen and twenty-six days before—whereas the three resisting animals were injected 66, 67, and 196 days before. It seems, then, rather probable that bacilli injected into the blood some weeks before copulation may remain alive in the body and be able to grow in the uterus if the cow conceives. On some farms where I tried vaccination by intravenous injection of bacilli I found similar results.

"An experiment with goats gave the result that two unvaccinated aborted two and three-and-a-quarter months, respectively, after swallowing 20 cc. of culture, whereas of five goats vaccinated intravenously twice with 10 cc. of culture three carried their kids to full term and two aborted. They were all fed either with culture (20 cc.) or with exudate. The two aborting were both vaccinated a rather short time—eleven and twenty days—before the copulation, the others were served a little later.

"In the experiments with intravenous vaccination of cows we made the curious observation that, while they never showed any pathological symptoms immediately after the first injection (that they got some fever, I have mentioned before), a second, and especially a third injection as a rule produced very marked symptoms of disease. After the second injection they turned dizzy and breathed frequently, and sometimes they fell down for a moment. After a third injection* they suddenly fell down immediately after the canula had been taken out of the vein, respiration was very frequent (ninety times to a minute), and they looked so weak that we feared they would die. After some minutes they got up again and would not eat immediately, but soon recovered.

"Although there does not seem to be any real danger connected with these peculiar accesses, they evidently make the intravenous injection a very unpractical sort of vaccination if it is to be used more than once or twice, and the fact that an injection into the vein one month before copulation involved a certain danger of producing abortion, instead of vaccinating against it, also made it very desirable to find better methods. We therefore made several experiments on the effect of subcutaneous injection of cultures containing living bacilli and of such cultures in which the bacilli were killed by means of toluol.

"In the year 1904-05 we made several experiments with sheep and goats. Some of them gave no satisfactory result because the exudate that we used in order to produce abortion by feeding seemed to be non-virulent, as the control animals did not abort nor did those vaccinated. In other series where we used cultures for infection, the control animals aborted, while the vaccinated animals—nine sheep and seven goats—carried their lambs and kids to full term. Of the sheep two were vaccinated intravenously and four subcutaneously with living cultures, three with cultures in which the bacilli were killed by means of toluol. For the goats the corresponding figures were two, three, and two. In almost all cases the injections were repeated several times, and the total quantity given to each animal was about 30 to 40 cc. These experiments then seemed to prove that the immunising power of the culture was the same when the bacilli were introduced under the skin as when they were injected into the blood, and even if the bacilli were killed by means of toluol. Further experiments made in the last year, however, proved this not to be the case.

"Fifteen goats and two sheep vaccinated by means of subcutaneous injection of living culture (50 to 70 cc. as the average to each animal, divided in five to seven doses) carried their kids and lambs to full term, although about two and-a-half months after conception they were fed with a great quantity (about 40 cc.) of exudate from an aborting cow, a feeding which produced abortion in four unvaccinated control goats. Quite different was the result of the vaccination by means of subcutaneous injection of a corresponding quantity of culture in which the bacilli were killed by means of toluol. Of

*The observations here mentioned belong to an experiment made in 1903 which gave no result, because the cows would not conceive.

ten goats vaccinated in this way, and fed as the others, seven aborted, and only three carried their kids to full term; and of two sheep treated in this manner one aborted and one carried to full term. Thus it seems evident that cultures in which the bacilli are killed have not at all the same immunising power as living cultures.

"As to the duration of the immunity we had opportunity to make the following observations: In 1903 five old goats, and four of them again in 1904, were treated with intravenous injection of living cultures, and both times carried their kids to full term, although they were fed with virulent matter. In 1905 we did not vaccinate them, but in January, 1906, we fed them in the same manner as the other goats. They all carried their kids to full term. This was also the case with the goat that had not been vaccinated since 1903. Immunity produced by living bacilli thus seems to last a long time.

"The main experiment of last year—that with cattle, is not quite finished yet, but I shall here give a preliminary report.

"In five heifers we injected subcutaneously in eleven doses a total quantity of about 180 cc. of culture, in which the bacilli were killed by means of toluol. Some months after the conception we fed them with a large quantity of infecting matter (about 200 cc. of exudate and fetal cotyledons). Three of them aborted after two-and-a-half to three months, but two carried their calf to full term.

"Four heifers were injected subcutaneously with living culture (an average 140 cc., given in ten increasing doses, beginning with 4 cc. and ending with 40 cc.). Three of them have not as yet aborted, although, exactly as the others, they have been fed with infecting matter three or five months ago. "Only one has aborted, which happened a little more than four months after the feeding, but it deserves to be noticed that in this heifer the injections as a rule produced abscesses, and it does not seem improbable that this may have been the cause of the bad result.

"Of the four unvaccinated control heifers one has not yet aborted, but three aborted two to three months after the feeding.

"It will be seen that subcutaneous injection of culture in which the bacilli are killed has not been able to produce immunity against a strong feeding injection, neither in cattle nor in sheep or goats. In some animals the result has been good, in others not. Subcutaneous injection of culture containing living bacilli has protected all my goats and sheep. As to the cattle, I have the hope that most animals will resist, but one heifer, in which the injection produced abscesses, has aborted.

"I am far from pretending that I have solved the question of vaccination against abortion, but I think that my experiments have made it probable that it will be possible in this way to get efficient results, and I hope to be able to continue the experiments, perhaps in a somewhat modified form. Whether in future vaccination will be the chief weapon against contagious abortion or not, time will show. At present, it must be our task to teach the farmers that they can do very much against this disastrous disease by isolation and disinfection. The main thing is that they may be made thoroughly to understand the nature of the disease and the many ways in which it spreads."

The above quotation, I feel, justifies the statement published in our article: "This investigator obtained definite protective results in experiments on sheep, goats, and cattle." It is more inclusive, I admit, than the work published in 1897, but in the recent reports we were giving our experimental data and not a bibliography. The latter had already been given, in some detail, in bulletin 353 of this Station.

In regard to M'Fadyean and Stockman, they carried on an extensive series of experiments covering various phases of the disease, and published in 1909, as referred to in our article.

Relative to their Experiment No. 66, on heifers 167 and 168, they purposely killed the animals before the termination of pregnancy, for bacteriological study. In their concluding statement on this series of experiments, they say:

"There seems to be no doubt that these two animals derived an active degree of immunity owing to the immunising injection performed on April 15. The results are the more striking when one compares them with those obtained on unprotected heifers inoculated intravenously with virulent material in which not a single negative result had to be recorded."

Stockman, in his position as Chief Veterinary Officer and Director of Veterinary Research of the British Board of Agriculture and Fisheries, continued to work with and recommend this method of controlling abortion, and in 1914 reported over three thousand vaccinations.

In 1921, Dr. J. R. Beach, of our staff, while in Europe attending the World's Poultry Congress, visited the British Ministry of Agriculture, and was taken by Captain Daubney to the new laboratory, about twenty miles out in the country, at Weybridge, where the abortion vaccine was prepared for distribution. In Leaflet No. 108, which he received at that time, is the following statement:

"Vaccine Treatment.—It may be mentioned that immunisation methods may be of considerable service in saving calves and hastening the production of herd immunity. It is also possible, in some cases, to stop further spread by testing for infection and isolating the infected animals. The Board are prepared to issue vaccine for use in infected herds, under certain conditions, for the inoculation of infected herds and to advise generally on methods. Applications should be made to the Chief Veterinary Officer, Ministry of Agriculture Laboratory, New Haw, Weybridge, Surrey."

In a mimeographed sheet of information which they were distributing at that time appears the following:

"Vaccination should not be adopted in non-infected herds.

"Anti-abortion 'A' is a living culture of the bacillus which causes contagious abortion. It is prepared at the Veterinary Laboratory of the Ministry of Agriculture and Fisheries, New Haw, Weybridge, Surrey, and sold to veterinary surgeons at two shillings and sixpence per dose (inclusive of carriage) for use in infected herds.

"It should be particularly noted that the vaccine is NOT a serum.

"The following notes on the use of Anti-abortion 'A' vaccine must be strictly complied with:

"1. It must be used on non-pregnant animals only.

"2. An animal must NOT be served until two months after vaccination. The period of two months is to allow time for resistance to the disease to be established, and for the vaccine (living bacilli) to be eliminated from the system.

"3. Full time calvers may be vaccinated as soon as they have cleansed and recovered from calving.

"4. Vaccination must only be carried out on animals in good health.

"5. If vaccination is carefully carried out, as a rule, nothing more than a small temporary swelling at the seat of inoculation is to be seen; in milking animals there is frequently a temporary reduction in the milk yield. A few animals show a considerable constitutional disturbance after inoculation.

- "6. This vaccine is sold without any guarantee whatsoever, and the Ministry of Agriculture and Fisheries accepts no responsibility for any loss or accident due to its use.
- "7. Applications for a supply of Anti-abortion 'A' should be addressed to the Chief Veterinary Officer at the Laboratory of the Ministry of Agriculture and Fisheries, New Haw, Weybridge, Surrey.
- "8. The Chief Veterinary Officer of the Ministry of Agriculture and Fisheries desires for the furtherance of knowledge on the treatment of this disease to continue recording the results of vaccination, and invites the cooperation of owners who have had the treatment adopted in their herds to record and forward the information specified on a form which will be sent from the Laboratory of the Ministry. The information desired is confidential and not for publication."

As a result of the work carried on by the Ministry of Agriculture in the United Kingdom, other parts of the British Empire have adopted this method of control.

With all of this information available, we feel we were justified in our statement: "Later it was studied extensively and used in the field by M'Fadyean and Stockman of the British Ministry of Agriculture."

This, together with much other data, has made it clear that experimentally the injection of live abortion germs is capable of producing a considerable degree of immunity in animals so treated against the premature expulsion of the fetus from *Bacterium abortum* infection in the following pregnancy.

We wish to make it understood, on the other hand, that the definite published belief that the above scientific fact has been established is a very different matter from recommending the widespread use of this method of control in the field without a careful study of its advantages and disadvantages in each individual herd.

Our present position in this matter is clearly stated in bulletin 353 of this Station, as follows:

"Despite the general concensus of opinion of investigators that the vaccine does reduce the incidence of actual abortion, and despite its continued distribution by the British Government over a number of years, the situation with regard to each individual infected herd should be considered thoroughly before this procedure is resorted to. This method is diametrically opposite to that outlined in the first plan. While there are conditions in which it is to be recommended, they certainly do not include any of those herds which might offer an opportunity to try out the first plan. Neither is it to be recommended for herds from which animals are constantly being sold for dairy or breeding purposes to go into possibly uninfected herds.

"In our opinion, owners are justified in using this method in heavily infected herds with a high rate of actual abortions, when the animals are confined in corrals on small pieces of land with no opportunity to segregate groups of animals or raise young stock. Additions to the herd from outside sources are therefore constantly necessary, and sales of animals from such premises are usually for immediate slaughter.

"Vaccine treatment is the simplest method of handling the disease and therefore the one which owners and veterinarians are liable to use without full consideration of the ultimate results. It is at best a means of reducing

the manifestations of the disease, but does not eliminate infection from the herd. Reported results from herds so handled do not give information as to the number of vaccinated animals which become permanent carriers of this infection, nor mention subsequent history over a period of years following the treatment, which is essential before this can be recommended on a wholesale scale."

We still feel that more information on the subject is needed, and to this end are carrying on rather extensive experiments with this particular phase of the abortion control problem.

It can readily be imagined, therefore, that I was somewhat startled to see our experiment animals, which we had under observation every day and many nights, listed from the other side of the continent as sterile when they were in the act of producing healthy calves.

The final solution of the abortion problem will result from hard experimental work on bovines, in the course of which many disappointments and some discouragement will be the lot of the worker. Cattle cannot be controlled throughout an experiment lasting years in the same way that we control laboratory animals. Bulls will continue to jump the fence in the future, as they have in the past, when cows on the other side are in estrus. Not being one hundred per cent perfect in the diagnosis of pregnancy, occasionally mistakes will be made. It is disappointing and discouraging to have to record them, but, even though they may not be recorded, men of experience know they have occurred just the same.

Many theories regarding this disease have been advanced in a way to give the impression that they were facts, without any experimental evidence to support them. Conscientious work is slowly but surely proving them to be baseless and thus reducing the theorists from distinction to notoriety. It is to be expected that attacks will become more and more severe with consequent falling prestige and dwindling following.

Provided foot-and-mouth disease, from which we have recently had a very close call, or some other calamity does not overtake our animals, which now include the dairy herd, repeated opportunities for further criticism will be given in the next few years.

The world knowledge will be finally developed so that methods to control this disease can be welded into such form that they may be carried out on a large scale. This is what the live stock industry is patiently waiting for. When that time arrives, the work will be done by cooperative effort of the mass of veterinarians and live stock sanitary officials and not by isolated

specialists who seem to be unable to separate the sterility problem affecting individual animals from bovine infectious abortion, a true infectious disease.

It is far easier to be critical than to be correct!

Plan To Go To Des Moines, August 19-22.

DOCTORS, AND "DOCTORS"

In France, where they still sometimes "order this matter better," they are taking action against the promiscuous use of the title "Doctor." A law has been enacted creating the degree of "doctor of veterinary medicine," and prescribing a heavy penalty for the use of it without authority or for the use of only the first word of it. Thus a graduate in veterinary medicine must always style himself "doctor of veterinary medicine," and if he calls himself simply "doctor" he is liable to a fine of 10,000 francs.

From this it is argued by some of the ablest French jurists that a similar penalty is incurred by any other doctor excepting one of medicine who styles himself by that title without a qualifying phrase. A doctor of law, or of divinity, or of philosophy, or of letters, must always be careful to specify the special quality of his doctorate, or suffer the penalty of outraged law. Only a doctor of medicine is entitled to be known simply as "doctor," and the use of that title without qualification is legally assumed always to indicate possession of the diploma of M. D.

The enforcement of such a rule would manifestly be impossible in America, as also in most other countries. Yet it might be wished that some check could be placed upon the too promiscuous use of a title which has long had, with a majority of people, a very specific and technically important significance. A man possessing any of the numerous academic doctorates, bestowed in course or honorary, is of course entitled to append to his name the initial letters denoting it. But as a prefix to the name it would avoid misapprehension and perhaps something worse if the title "doctor" were confined to graduates in medicine. That it ever will be, however, there is scarcely the slightest chance.—
(Editorial in the *Washington Post*.)

Have You Secured One New Member This Year?

WHAT THE B. A. I. HAS DONE IN THE SAN LUIS VALLEY¹

By L. L. GLYNN, *Monte Vista, Colo.*

This paper does not pretend to be a laudation of the actions of the Bureau of Animal Industry, nor is it written in a spirit of criticism. It is merely a brief account of my observations of the actions of the B. A. I., in the San Luis Valley, in the last fifteen years.

Here I must define my viewpoint. For most of ten years I was engaged as a veterinary inspector for the B. A. I. in the valley, and for the last five years I have been a private practitioner in the valley. During this ten-year period the main work was the control and eradication of sheep scab. Incidentally I was to keep my eyes and ears open for information of any serious contagious disease in live stock.

The sheep scab work was the routine. Three hundred thousand range sheep grazed in the San Luis Valley over an area as large as the state of Connecticut, and in the winter from 250,000 down to 90,000 lambs were fed in the pea fields. The inspectors saw all these sheep at least once a year; covered by horseback, team and buggy, train, or auto, all of this area; inspected, quarantined, and dipped sheep all the year around; and eventually eradicated sheep scab from the San Luis Valley and had that amount of area released from quarantine. This was a great accomplishment.

While doing this, other things came up. Cattle scab broke out a number of times and was promptly suppressed. Contagious abortion on a rather extensive scale was investigated and suggestions offered which led to its suppression. Vesicular stomatitis broke loose on us before either of the two inspectors in the valley had any idea that this disease existed in the United States. This was as carefully quarantined as if it had been foot-and-mouth disease (which, indeed, we suspected it of being). Experimental inoculations were made and careful account kept of the lesions and class of animals affected. Hog cholera was investigated and data gathered. Lamb losses in the pea fields were extensively and intensively studied, and various other problems of smaller moment were looked into.

¹Read before the twenty-first annual meeting of the Colorado Veterinary Medical Association, Denver, Colo., Jan. 23-24, 1924.

During this time the veterinary inspectors were closely associated with the live stock men, talking over their problems with them, making suggestions, giving advice, and occasionally actually treating sick animals or performing operations.

Understand, gentlemen, that this paper is in no way officially connected with the Bureau; it does not attempt in any way to define the Bureau policies, nor have the Bureau men been consulted when I prepared this paper. It is purely and solely my observations.

To resume: The veterinary inspector helped to educate the live stock man in the uses of a veterinarian in contra-distinction to the uses of an empiric. This was well worth while. The veterinary inspector was closely associated with the local practitioners, and their relations on the whole were cordial. Understand, gentlemen, that back in 1910, and for a few years following, the local practitioners in the valley were engaged mostly with individual cases of diseases and disorders, and very little if anything was being done by them in the control or eradication of contagious diseases. The local practitioners, in fact, left such work to the B. A. I. men, and even called them in to take over such work.

Today that condition has changed. An association to control hog cholera was formed and a veterinarian was engaged to carry on this work. Today the modern veterinarian, with his specialized knowledge in the causative factors of disease, in the methods for the control of these factors, with his knowledge of the sanitary measures to be taken, and with his power to use the various biological preparations for the prevention and cure of diseases, is well fitted to cope with these situations, and is in fact so doing.

Today the B. A. I. has no inspector in the San Luis Valley. The local practitioners are on the alert for any contagious disease, and are constantly fighting for the control, prevention and eradication of those diseases which now exist here. Should the valley at any time be threatened with an outbreak of some contagious disease, which might need state or federal control, I feel sure that there would be no hesitancy on the part of the practitioners here so to notify the State Veterinarian.

In connection with this very matter, the practitioner has, from time to time, to appeal for help to some outside agency. Lately it appears as if the Bureau hesitates to respond to such an appeal.

Some abuses have crept in, but these have been mostly of a personal character. B. A. I. men have at time practised too much and so drawn trade away from the local men. B. A. I. men have, by their actions and words, belittled some practitioners, reversed their diagnosis without consultation, suggested changes in treatment and preventive measures without even notifying the local man of such action. Hogs have even been vaccinated by B. A. I. men and a nominal charge made. These and other abuses are merely the human equation factor of any organization, and the B. A. I. is no exception.

On the whole, therefore, looking back now from the standpoint of a practitioner, I am fully convinced that the B. A. I. activities in the San Luis Valley have been a wonderful help to the live stock industry and to the practitioner.

Does Your Wife Know About The Women's Auxiliary?

COMING VETERINARY MEETINGS

Saginaw Valley (Mich.) Veterinary Medical Association. Saginaw, Mich. Aug. 7, 1924. Dr. W. E. Coomer, Secretary, 907 W. Midland St., Bay City, Mich.

Florida State Veterinary Medical Association. College of Agriculture, Gainesville, Fla. Aug. 13-14, 1924. Dr. A. L. Shealy, Secretary, University of Florida, Gainesville, Fla.

Ontario Veterinary Association. Semi-Centennial Meeting. Harris Abattoir, St. Clair Avenue West, Toronto, Ont. Aug. 13-14, 1924. Dr. James S. Glover, Secretary, c/o Farmers' Dairy Co. Ltd., Walmer Road and Bridgeman St., Toronto, Ont.

Minnesota State Veterinary Medical Association. University Farm, St. Paul, Minn. Aug. 14-15, 1924. Dr. C. P. Fitch, Secretary, University Farm, St. Paul, Minn.

American Veterinary Medical Association. Fort Des Moines Hotel, Des Moines, Iowa. Aug. 19-20-21-22, 1924. Dr. H. Preston Hoskins, Secretary, 735 Book Bldg., Detroit, Mich.

Western Michigan Veterinary Medical Association. Grand Rapids, Mich. Aug. 28, 1924. Dr. J. Y. Veenstra, 349 La Grave Ave. S. E., Grand Rapids, Mich.

OPHTHALMIA OF THE HORSE¹

By JOHN W. ADAMS, Philadelphia, Pa.

School of Veterinary Medicine, University of Pennsylvania

Differential diagnosis of periodic ophthalmia, the ophthalmia of influenza and traumatic ophthalmia is important, but not always easy.

Periodic ophthalmia involves primarily the iris, ciliary muscle and choroid; secondarily the cornea, lens and its capsule, vitreous body and retina. It leads eventually to opacity of the lens, adhesion of iris to capsule of lens, liquefaction of the vitreous body, detachment and atrophy of the retina and atrophy of entire eyeball.

Influenza is frequently accompanied by marked edema of eyelids and conjunctiva and moderate haziness of the cornea. Occasionally there is also a serofibrinous iritis with voluminous exudate into anterior chamber. Rarely there is cyclitis followed by opacity of the lens. It is a question whether influenza ever leads to choroiditis with permanent injury of the retina.

Traumatic ophthalmia, from its multiplicity of causes, varied nature and extent of possible injuries, presents an anomalous clinical picture. Superficial wounds and abrasions of the cornea are most frequent. Shock may tear the capsule of the lens followed by opacity of the lens in a few days, without leaving a mark on cornea or sclera. Punctured wounds when infected lead to suppurative panophthalmitis and loss of the eyeball.

Preparatory to inspection a two per cent cocaine solution should be instilled. If the fundus is to be examined, a one per cent atropin solution should be instilled two or three times during the course of twelve hours. The most satisfactory light is sunlight, which should shine into the horse's face. On a cloudy day, place the patient in a darkened room facing an open window or door distant three or four feet. A spot-light will answer at night. The following facts will aid in a definite diagnosis:

I

ACUTE OPHTHALMIA

Periodic Ophthalmia

Influenza

Traumata

- | | | |
|--------------------------------|----------------------------------|-----------------------------|
| 1. Affects one eye
usually. | 1. Affects both eyes
usually. | 1. Affects one eye usually. |
|--------------------------------|----------------------------------|-----------------------------|

¹Reprinted from Univ. of Pa. Veterinary Extension Quarterly, XXIV, 16.

2. Appears suddenly, over night.
3. Temperature elevated one to two degrees.
4. Slight swelling of eyelids.
5. Conjunctiva reddened.
6. Marked periorbital injection.
7. Extreme photophobia.
8. Pupil narrow and immobile.
9. Pupillary reflex greenish.
10. Sero-fibrinous exudate, blocking the pupil and settling in the bottom of anterior chamber about the third or fourth day.
11. Iris yellowish-brown and velvety in appearance.
12. Eye may clear up in 14 to 21 days.
13. A single attack always leaves its mark.
14. Usually several attacks in the course of a year or more ending in complete blindness. The earlier attacks are at shorter intervals. A single attack may destroy the sight.
2. Appears gradually in course of two or three days.
3. Temperature up four to seven degrees.
4. Eyelids markedly edematous.
5. Conjunctiva yellowish, edematous and glassy.
6. No marked periorbital injection, as a rule.
7. Mild photophobia.
8. Pupils moderately contracted and sluggish to changes of light.
9. Pupillary reflex normal.
10. May be present or absent.
11. May be so or not.
12. Eyes usually clear in 7 to 10 days.
13. There is but one attack, which usually leaves the eye undamaged.
14. In rare cases, the single attack produces iritis and cyclitis and leaves opacity of the lens and some adhesion between lens and iris (posterior synechia).

II

PERMANENT LESIONS (after two or three years)

Periodic Ophthalmia

1. Both eyes shrunken and soft (phthisis bulbi).
2. Eyes retracted.
3. Iris dull, lustreless and smudgy in patches of yellow, green, brown, and black.

Influenza

1. Eyes not shrunken nor soft.
2. Eyes full.
3. Iris bright hazel in color, with normal lustre.

4. Pupil irregular, torn and denuded.
5. Lens and capsule opaque.
6. Iris either attached to lens or widely dilated and paralyzed. This animal has a dead retina and liquefaction of the vitreous body and sees nothing.
4. Pupil usually of normal contour.
5. Rarely lens and capsule are opaque.
6. Iris normal, or in case cataract is present may be attached at points to capsule of lens. The unattached portions respond to changes in light. Such a horse sees objects indistinctly through a clouded lens and is a shyer.

Have You Secured One New Member This Year?

STUDY MADE OF MEADOW DEATH CAMAS

Specialists of the United States Department of Agriculture, engaged in the study of plants poisonous to live stock, have recently completed a study of the meadow death camas, known scientifically as *Zygadenus venenosus*, which, they say, is one of four species most likely to be encountered by stockmen using the western range. The other species are "grassy" death camas, "foothill" death camas, and "mountain" death camas.

The species known as "meadow" is characteristic of the States bordering on the Pacific Ocean. It affects sheep more than any other class of animals, but horses are poisoned by it and sometimes killed. While it is poisonous to cattle, few are injured under range conditions, and swine are probably not harmed at all, because they promptly expel the plant by vomiting if they do eat it.

This species of death camas has about the same poisoning power as the grassy death camas and these two are three times as toxic as the foothill variety and seven times as toxic as the mountain death camas. Although it takes about the same quantity of meadow camas as grassy camas to produce symptoms of poisoning, it takes much more of it to produce death. Grass death camas is the most dangerous, followed by meadow death camas and foothill death camas, which are about equally potent in producing death.

The results of this investigation, which was carried on by C. D. Marsh and A. B. Clawson, of the Bureau of Animal Industry, have been published in Department Bulletin No. 1240, which may be had upon request by those interested in the details of the investigation.

A NEW FIELD FOR THE VETERINARIAN—FUR-BEARING ANIMALS IN CAPTIVITY

By WARD GILTNER, *East Lansing, Mich.*

Dean, Division of Veterinary Science, Michigan Agricultural College

The Veterinary Division of the Michigan Agricultural College recognizes the importance of a new industry, the domestication or farming of fur-bearing animals. Already in Michigan there have developed ranches for the propagation of the silver fox, skunk, beaver, mink, muskrat and marten.

In the veterinary course, in addition to considering all the diseases of the domesticated animals, an effort is made to familiarize the students with the diseases of pet stock and the fur-bearing animals in captivity as well as the wild animals commonly found in zoological gardens. Special attention is given to the problems arising from the modern industry of fox farms and other establishments devoted to the care of fur-bearing animals. In each of the departments in this Division attention is given to the appropriate phases of the subject. Special courses dealing with the hygiene of fur-bearing animals are included in the curriculum as part of the work of the Department of Bacteriology and Hygiene. Already graduates of this department are in the services of such farms and one graduate has for the past four years been in charge of the United States Experimental Fur Farm of the United States Biological Survey at Keeseville, New York.

Dr. W. L. Chandler will have charge of these special courses. During the past four years he has visited many different silver fox farms in the United States, studying the parasitic diseases of the silver fox; and, during the past two years has spent his summer vacation periods conducting researches on the control of parasitic diseases of the silver fox. In this work an unusual opportunity was afforded for studying various phases of the silver fox industry. He states that:

"The silver fox industry is perhaps the most rapidly growing live stock industry in the world today. From a few pairs in 1910, the number of these animals increased to 18,000, by the fall of 1923; and the probabilities are that by next summer this number will have nearly doubled. This industry, in the United States alone, supports two large organizations—national in scope—several state organizations and two first-class monthly magazines. Actively engaged in this industry are found men and women of all walks of life; farmers, business men, professional men, public officials, men and women of small

means and men with extensive capital. The fox ranches are either individually owned and operated, or are owned by companies. In numerous instances not all of the animals on a particular ranch belong to the ranch owner, but have been purchased by various individuals—usually business or professional men—who have entrusted the care of them to the rancher, and who either sell the offspring of their original pairs to, or through, the mother ranch, or later build and operate ranches of their own. At present animals are raised primarily for sale as breeders; only inferior animals being pelted.

"As has been the case with other profitable and rapidly growing industries, the silver fox industry has offered an opportunity for speculation; and, in the not too recent past, one frequently encountered the activities of brokers, stock promotion schemers and even fake stock promoters. The silver fox industry however, due to the efforts of its organizations, to a rigid system of registration of both ranches and animals, and principally, to the fact that men of high moral character and sound business principles have become actively engaged in the industry, has apparently successfully weathered the "awkward age" in its development, and having established stable—near pelt value prices—and fixed standards may be said now to be on a sound commercial basis. It must not be understood from this however, that all chances of fraud have been eliminated. Such a thing would be impossible under any system. The best safeguard against fraud is for the prospective buyer thoroughly to consider the character of the man from whom he expects to make the purchase. It is also well to purchase only animals which have been admitted to advanced registration.

"The ultimate aim of the silver fox industry is, of course, the production of furs. Silver fox furs, because of their extreme beauty, and the fact that they are about the only fur that cannot be imitated, have always been in demand; and, for the past 400 years have brought the highest prices on the London market. It is safe to assume that silver fox furs will always be in demand as a stable article of clothing. Moreover, since the regions suitable for the production of furs are limited to those having long, cold and moist winters—this includes the greater part of Michigan—it is unlikely that the production of silver fox furs will ever be overdone.

"While parasitic diseases are probably no more prevalent in the silver fox than in any domesticated animal, yet, because of the fact that the silver fox in captivity must be unnaturally and closely confined, and in many instances is fed for the most part unnatural foods, parasitic diseases, if unchecked, are capable of causing more serious damage to the silver fox than in the case of many other animals. Many fox ranchers, realizing this fact, have recognized the advisability of maintaining strict sanitary conditions of the fox ranch and have employed veterinarians and others trained in veterinary science as managers of the ranch."

Dr. Chandler further says:

"From a scientific standpoint, the success of the present efforts to domesticate fur-bearing animals will mean much to humanity. In the first place, domestication is the only means whereby it will be possible to conserve fur-bearing animals to future generations. That these animals should be conserved goes without saying. They are not only beautiful but they supply an article of clothing that is just as essential as a woolen suit. In the second place, when fur-bearing animals in captivity are killed for the purpose of pelting, the killing is done in a humane manner and the animal is not allowed to suffer for days with his legs in a steel trap as is done in the wilds today. Moreover, through domestication, it will be possible to apply scientific methods in selection and breeding, which will undoubtedly result in the production of superior types and a greater variety of types of various fur-bearing animals."

An article by Dr. Chandler appeared in the February, 1924, Quarterly Bulletin of Agricultural Experiment Station, Michigan Agricultural College, entitled, "On the Vermicidal Value of Iodine, With Notes on Two New Iodine Preparations and

Suggestions as to Their Probable Therapeutic and Disinfectant Values." Already a brief report on this work had been read before the Lansing Section of the Association of American Bacteriologists, at their annual meeting at East Lansing, Michigan, November 16, 1923; and an abstract of that paper had been presented for publication in *Abstracts of Bacteriology*.

A paper on that phase of this work which concerns the silver fox industry had been read before the National Silver Fox Breeders, Association of America, at their annual meeting at Milwaukee, Wis., November 26, 1923; and was published in the December number of the *Black Fox Magazine*.

CANADA HAS NEW ANIMAL

A new breed of live stock, which may have a bearing on the future meat supply, has been developed in the national park at Wainwright, Alberta, by crossing buffaloes with yaks. It is said that the stock has heavy beef qualities, combined with a good rustling nature.

The breed has been given the name "yakalos," and it is believed that they will prove more practical than "cattalo," evolved several years ago by crossing buffaloes with domestic cattle. "Yakalos" breed true to type, are sturdy and able to forage for themselves.

More than 1,500 buffalo calves were born this year in Wainwright park, which makes up for the excess sires killed last winter. The herd now numbers 6,000 full-grown buffaloes, the largest in existence.

NEWS NOTES

An outbreak of rabies in Portland, Mich., occurred recently, followed by an order issued by the local health officer to confine or muzzle all dogs.

The council of Fennville, Mich., has made a ruling that all cows supplying milk to be sold in the village must be tuberculin tested.

An ordinance has been passed requiring the tuberculin testing of all cows supplying milk to the city of Jenkins, Ky., as the outcome of educational work on the part of the Kentucky Agricultural College Extension Department, the U. S. Bureau of Animal Industry and the State Veterinarian, Dr. W. H. Simmons.

THE FARM HORSE SITUATION IN EASTERN IOWA

By HENRY HELL, Wilton Junction, Iowa

Complying with a request from the Editor to write a short article for publication in the JOURNAL, relative to the above subject, I will say that for the past three or four years I have endeavored to keep myself posted as to the drift of the farm horse industry, in this and adjoining territory, through census figures that township assessors were kind enough to furnish me from time to time.

A township, where boundaries are unobstructed by streams or otherwise irregularly outlined, is laid out to contain 36 sections of land. Our farm of average size may well be said to be one-quarter section. Some give the average as 120 acres. If we take the quarter-section average, there are 144 average farms per average township. It is well agreed that 7 work horses are absolutely necessary for the working of this quarter-section farm, under present-day conditions. This is exclusive of young stock and breeding animals not suited for working.

Figuring 144 farms, and 7 work horses per farm, brings the total work horses needed per township up to 1008. There are, on an average, about 15 townships per county, which brings the county total up to 15,120. With 99 counties in Iowa, it makes a total of 1,496,880 horses in Iowa, or, in round numbers, one and one-half million. This includes only the horses necessary to till the soil of Iowa farms. The average age of these animals is 12 years, allowing that the average farm work horse is able to perform its usual labor up to the age of 20 years, some longer, others not so long. Then the period of usefulness of these horses is 8 years, the difference between 12 and 20.

Let us divide this period of usefulness into the sum total of work horses in Iowa, that is to say, 8 into 1,500,000, and we find that we will retire 187,500 horse annually by the age limit alone. This is further borne out by the fact that townships report from 100 to 150 less horses on the farm this year than last. A loss of 100 per township figures up 150,000 for the state. So I do not think we are kidding ourselves much on the above computations, although they look like a pessimistic pipe dream.

RECONSTRUCTION

Reports for the past three years have shown an average of 15 yearlings per township, holding steady, with no marked increase or decrease in breeding. Many have expressed themselves as willing to breed a mare or two if there was a stallion to their liking in the neighborhood. Stallion men are not keen to invest their money in high class stallions to mate with aged mares, where the percentage of foals is likely to be small. Others say that they will not raise colts as long as they can buy them cheaper than they can raise them.

Taking 15 as the number of yearlings produced per township, we can figure a total of 22,500 for the state. Deduct this from the 187,500 retired by age, and you have a shortage of 165,000 annually for Iowa. We have experienced our first work horse shortage this spring. It has not been serious nor extensive. We have shipped in quite a number of carloads of work horses from the Dakotas. All have found a ready market, at fair prices for the kind of horses offered. Many more could have been sold and higher prices would have prevailed had there been more ready money in the hands of the farmer. A good many farms are running with one or two horses short right now.

THE FARM TRACTOR

The usefulness or uselessness of the tractor must vary with the different types of farming, different soils, moisture and other conditions. Our soil here is of Kansan and Illinoian drift plains, with their loessial coverings. The Muscatine silt loam and the Memphis silt loam in the rolling phase and the Wabash silt loam in the colluvial phase. These comprise about 80% of the total soil area, or that commonly used in ordinary farming.

These soils are quite susceptible to what we term "packing," when wet or even moist. No heavy traffic should be put upon them. Running stock in corn fields when muddy, or running a manure spreader over the fields when soft, has a decided detrimental effect on the soil, so that when it is plowed, it breaks up in chunks, and it takes lots of work, a favorable season, or several years of tilling to overcome this condition. What the average farmer has to say about the tractor, after using one on his fields for several years, is not in favor of the tractor. The tractor has proven a decided failure as a factor in tilling the soil under the conditions existing in Iowa.

SOME VETERINARY REMINISCENCES

III Investigating an Outbreak of Glanders

By N. S. MAYO, Chicago, Ill.

No one should infer, because I was a college professor, that I wore spectacles and long whiskers. As a matter of fact, I was only a kid and looked as young as I was. A number of times I was mistaken, by college students, for a freshman.

In 1891 or '92, I attended a stockmen's meeting, I think in Kansas City, and having been called on "to make a few remarks," I said something about the danger from bovine tuberculosis. Ex-Governor Glick, a breeder of Shorthorn cattle, was there, and to say that he "jumped on me with both feet" is putting it mildly. He asserted with eloquence and vigor that he didn't believe "there was a case of tuberculosis in cattle within five hundred miles," and "in that wonderful climate it could not exist." Surely times have changed.

I had been in Kansas a few years when the legislature abolished the office of state veterinarian and turned the work over to the professor of veterinary science at the college. A former state veterinarian, who had given very little attention to the work, when called to investigate live stock losses, was accustomed to intimate to the owner that his stock had been poisoned by an enemy. When the notice of the change appeared, Dr. S. L. Hunter, of Fort Leavenworth, wired, "Thank God, there won't be so much malicious poisoning of live stock."

Malicious poisoning of live stock has been rare in my experience—only two authenticated cases. In one, an insane man poisoned some cows by putting Paris green in apples, and, in the other, a man was convicted of attempting to poison a neighbor's stock by putting broken glass in the feed. I have, however, observed several other cases where, in my opinion, stock had been maliciously poisoned.

There were very few graduate veterinarians in Kansas in the early 90's. Dr. R. C. Moore was at Holton; Dr. Pritchard, at Topeka; Phillips Brothers, at Wichita; Dr. Cook, at Hutchinson; W. H. Richards, at Emporia; C. J. Sihler, at Atchison; Dr. S. L. Hunter was veterinarian at Fort Leavenworth; W. B. Welch, at Salina; Drs. Orr and Brady, at Manhattan. Dr. L. Enos Day wandered out into the "short-grass country," about this time, but as good horses were selling around ten dollars each, he

"hoofed it" east as fast as he could. Most of the graduate veterinarians were located in the large cities of Central and Eastern Kansas. In other places the bewhiskered quacks flourished under the proverbial green bay tree.

As state veterinarian I was frequently called by the sheriff of a county. The sheriff was supposed to investigate reported outbreaks of contagious animal diseases and if, in his judgment, they were important he put on a temporary quarantine and called the state veterinarian. This was to prevent stockmen from calling the veterinarian in order to have him treat a poll evil or spavin. They used to fabricate some thrilling telegraphic requests along this line.

One time I was called by the sheriff of a western county to investigate suspected glanders. Upon my arrival, the sheriff said there was only a non-graduate horse doctor there, and that he wanted to take me out to see the case. "Doc don't think it's glanders," he said. "Doc" drove around with a well-matched team, big Stetson, and whiskers. He looked pompous enough to be governor of the state. One of his horses was lame, and he said it had "sprained his leg." I picked up the horse's foot and asked him for a pair of pliers. He wanted to know why, so I told him I wanted to pull out the sprain. After the nail was removed, the lameness disappeared. This took all the pomposity out of "Doc."

When we reached the farm, "Doc" drove his team under a shed, and I went to look at the suspected horses. I had a small flash-light, and a casual examination revealed advanced cases of glanders. As soon as the announcement was made, "Doc" made a "bee-line" for the shed, got his team out and fanned their noses with his sombrero, "to get bad air out so the horses won't ketch no glanders." On the way back, "Doc" wanted to buy my flash-light, because he "could put up a big front with that." Of such, in most cases, is the kingdom of quacks.

(An error was made in giving the sub-title of the second installment of Dr. Mayo's reminiscences, in the July issue, as "Testing the Tick Theory." This was the sub-title of the first installment, published in June. The correct title for the July issue was "The Hog Cholera Cure That Failed." We are planning to publish an installment of these interesting reminiscences of pioneer days, each month. Editor.)

We Have Room For A Thousand New Members This Year.

A newly discovered type of fur-bearing flying animal was recently reported from the wilds of French Cochin-China.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

EVERSION OF THE UTERUS

By E. T. BAKER, Moscow, Idaho

"Throwing out the withers" is a rather common accident among cows in the West; heavy, fat animals of the Hereford and Shorthorn breeds being the most frequent victims. Milk cows are fairly free from this condition, although the writer has a dozen or so cases a year. A peculiar thing has been observed, in that since cows are so valuable, the owner now calls for help sooner than he used to, and consequently we have a better chance to replace the everted organ. Until I had an opportunity to observe the manner in which old cattle men handled this condition among range "critters," it really made my heart sink clear down into my number 9 army shoes whenever I was called out to treat a case of this kind.

The photo illustrating this article shows only a partial eversion, but she was an old offender at this, having had two previous prolapses, and was a very temperamental cow, which is a polite way of expressing my opinion of her. The ligaments were evidently weak naturally, and with the weight of a big, bull calf, the whole genital tract seemed flaccid and lacked tone. The owner had tied a rope round her belly to keep her from straining too violently, and this had done some good. She was down, with her hind parts down hill, as usual, and getting her up, we raised her hind parts as high as possible with a forkful of bedding. It was at this time that the Graflex was snapped, and the photo taken.

The first thing was to give her a drench of one ounce of chloral with gum acacia, in a pint of water. Then, an H. M. C. was given hypodermically, and we crawled into an oiled suit. We got everything ready, because one must work fast and furious, and when the parts are replaced, everything should be within reach without taking the right hand out.

Two very important factors occur in replacing the organs: First, get the cow up, or have her in a ditch, with the head

down. However, the writer now prefers her standing and, if necessary, a block and tackle is used. With a cow down on her side, or even up on the brisket, you can lie down in any of several positions and perform fourteen dollars' worth of manual labor and accomplish about as much as a six-year-old kid. Second, put in sutures, and put 'em deep. Range men often use bull rings, while sheep men use sack twine or baling wire, on ewes. This does not sound very scientific, but when I used to follow textbook technique, my percentage of recoveries was about one out of a dozen; now they are 95%.

The prolapsed parts were syringed off with a good, hot permanganate and sodium chloride solution, mixed up in true

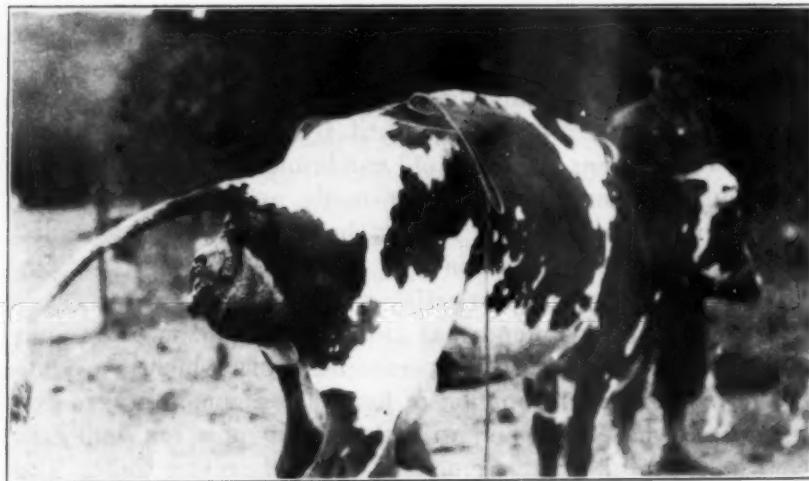


FIG. I. Eversion of uterus. (Photo taken by author, with a 3A Graflex, 1/75 sec. F. 8. Bright day in May, about 3:00 p. m.)

practitioner fashion—mostly by guess. The less you irritate the uterus the better. The left hand is now placed under the mass, and the right hand, clenched so that the finger nails are out of sight, begins to push the organ back, beginning at the parts closest the body. A man stands on each side, with his knee up into the flank, with the rope still around her belly. They are told to keep her up, and usually do, at the expense of some very expressive Western profanity, and with many grunts on the part of both men and beast!

Between strains, the os is pushed back, then the middle, and finally the lower parts. The operation is more like "feeding it back" than any other description which could be used. The arm is held in for a few minutes, while the cow puts in her

leisure time at trying to push it out again. Pretty soon, there is a lull, and still keeping the good, old right hand in, the injection tube is introduced with the left hand. One gentleman, to the right oblique, begins working the pump, and several gallons of the warm solution are pumped in. This serves a double purpose, as it seems to straighten out the wrinkles, weight the organ in proper position, and perhaps allays irritation. The liquid is now siphoned out, and with the right hand still in, a uterine capsule (mostly boric acid) is introduced and placed as far back as possible.

A no. 1 Loopuyt needle, threaded with wire, is at hand and, as quickly as possible, two or three interrupted sutures are taken deep in the lips of the vulva. In real mean animals, one can put a stitch or seton in the back over the lumbar region, to keep old Bossy from humping up and taking an extra good strain. One should leave the rope around the belly, and one can make a loop of small rope, like a truss, as a precautionary measure until the stitches get set.

Most funerals occur from pushing the finger nails through the organ and tearing it, and one should guard against shock, milk fever, eclampsia, septicemia, and impaction of the rumen. In valuable cases bacterins may be used, and it is always good treatment to leave some medicine of a laxative nature for the owner to give. Unless something out of the ordinary sets in, it is unnecessary to make a second trip. The stitches can be left in for a week or so, and no aftercare is required.

Trusses, harnesses, "aseptic operations," and other classic procedures have no place in this condition for me any more. Like the old cattle man who stripped off and said: "You buckaroos hole that thar blankety blank heifer up an' keep her up till I git th' works back in!" That is my treatment now—not terribly scientific, but the end results are very pleasing, and that is the main thing while working on that end.

Does Your Wife Know About The Women's Auxiliary?

TRIBUTE TO PONY EXPRESS RIDERS

A bronze tablet has been placed on the site of an old pony express station, at Salt Lake City, by the Daughters of the American Revolution. It bears this inscription:

"PLACED IN TRIBUTE TO THE PERSONNEL
OF THAT GALLANT ENTERPRISE"

ABSTRACTS

THE NUMBER OF GENERATIONS NECESSARY FOR THE DEVELOPMENT OF THE POWER OF AEROBIC GROWTH BY BACTERIUM ABORTUS (BANG). Amanda Harms, Jour. Bact., ix (1924), 273.

The power of early generations of cultures of *Bact. abortus*, derived from pathologic materials, to grow in the presence of air, varies greatly with different strains. Of eighteen strains studied, two developed in the presence of air in the first generation, two others in the second, and one other in the third. Of the eight remaining strains, five still failed to develop in the fifth generation, three in the eighth and two in the twelfth. All grew well in the presence of air in the thirteenth and subsequent generations. When strains once became accustomed to growing in the presence of air, they retained this character indefinitely, even through animal passage.

W. A. H.

STUDIES ON PASTEURIZATION, XI. THE "MAJORITY" AND "ABSOLUTE" THERMAL DEATH-POINTS OF BACTERIA IN RELATION TO PASTEURIZATION. S. Henry Ayers and Wm. T. Johnson, Jr., Jour. Bact., ix (1924), 279.

As the temperature of a fluid containing bacteria is raised above the growing range of the organisms, a few cells die. With further increases more and more cells perish. The lowest temperature at which all of the cells die is known as the "absolute" thermal death point. That temperatures which suffice to destroy the majority of cells, though not all, is known as the "majority" thermal death point.

Tests upon a culture of *B. aerogenes*, suspended in milk, have shown that there is a wide difference between the "majority" and the "absolute" thermal death point for this organism. When 1-cc portions were cultured, apparent sterility frequently was observed in samples which had been heated below 135° C. Larger portions frequently showed growth after being heated to a little above 150° C.

It is pointed out that the difference between the "majority" and "absolute" thermal death points of organisms may have great significance in the bacteriological control of commercial

pasteurizing processes, inasmuch as the relatively small samples, which may be examined conveniently, really give "majority" and not "absolute" results. Positive results which are based upon the survival of the test organism are of value, in these cases, but reliance cannot be placed upon negative tests to assure complete destruction of the organism.

W. A. H.

STUDIES ON PASTEURIZATION. XII. CAUSE AND SIGNIFICANCE OF PIN-POINT COLONIES FROM PASTEURIZED MILK. S. Henry Ayers and Wm. T. Johnson, Jr., Jour. Baet., ix (1924), 285.

The appearance of large numbers of "pin-point" colonies in agar plates made from commercially pasteurized milk has caused considerable concern to dairy and health officials in several parts of the country.

Pin-point colonies probably result from overcrowding on the plates through the use of dilutions which are too low. In one milk plant which was examined, the pin-point colonies were found to be due to a thermophilic organism which multiplied rapidly at the pasteurizing temperature. This organism has been termed *Lactobacillus thermophilus*. A complete description of the organism is given. This organism is probably always present in raw and skimmed milk but in variable numbers. It appears to be a harmless saprophyte.

Pin-point colonies may also be due to non-thermophilic, heat-resisting bacteria.

W. A. H.

Have You Secured One New Member This Year?

DAIRY DIVISION NOW A BUREAU

Appointment of Dr. C. W. Larson as chief of the new Bureau of Dairying of the Department of Agriculture, created under an act of the last session of congress, was announced July 3, by Secretary Wallace. Dr. Larson, since 1921, has been chief of the Dairy Division of the Bureau of Animal Industry, the work of which, together with all other activities of the department, relating to the dairying industry, has been transferred to the new bureau.

ASSOCIATION MEETINGS

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the President, Dr. J. Elliott Crawford, in the Academy of Medicine, 17 W. 43rd St., on Wednesday evening, April 2, 1924 at 8:30 p.m.

The minutes of the March meeting were read and approved.

Dr. Edward Lodholz, Professor of Veterinary Physiology, University of Pennsylvania, Philadelphia, Pa., was the speaker of the evening. He gave a most interesting talk on "Emotions in Health and Disease." Prof. Lodholz gave a number of examples of emotions in man and compared them with the various similar emotions found in animals. In one case an animal may, by a certain stimulus, change an emotion of fear into an emotion of anger. Many similar instances were cited.

Dr. W. Reid Blair described various emotions noticed in animals while being handled in the New York Zoological Park. Dr. Geo. H. Berns spoke of various cases in green horses, where they developed emotions of fear, fright and flight. A number of others present joined in the discussion.

A rising vote of thanks was extended Dr. Lodholz for his most scientific and instructive talk and the hope was expressed that we could have him return at a later date to continue his talk on these subjects.

The discussion of Dr. Little's paper read at the March meeting was deferred until the May meeting.

The Treasurer reported having received the sum of \$100 from the chairman of the prosecuting committee.

No further business appearing, the meeting adjourned.

C. G. ROHRER, *Secretary*.

Does Your Wife Know About The Women's Auxiliary?

MASSACHUSETTS VETERINARY ASSOCIATION

The annual meeting of the Massachusetts Veterinary Association was held at Young's Hotel, Boston, May 28, 1924. This meeting was in the form of a banquet, at which the ladies were present, somewhat of an innovation for this organization.

At a business session an election of officers resulted as follows: President, Dr. John B. Lentz, Mass. Agri. Coll., Amherst; First Vice-President, Dr. F. H. Bradley, Plymouth; Second Vice-President, Dr. W. F. McNamara, Worcester; Secretary-Treasurer, Dr. Harry W. Jakeman, Boston.

At the banquet the speaker of the evening was Dr. E. A. Watson, of Ottawa, Canada, who spoke on the interpretation of the tuberculin test, as applied to the eradication of bovine tuberculosis. Dr. Watson brought out many interesting points which open up new channels of thought in connection with tuberculosis control.

Entertainment was provided and the members present voted the occasion one of the most enjoyable ever held by the Association.

H. W. JAKEMAN, *Secretary-Treasurer.*

Plan To Go To Des Moines, August 19-22.

BUCHANAN COUNTY (IOWA) VETERINARY MEDICAL ASSOCIATION

The Buchanan County (Iowa) Veterinary Medical Association was organized, June 4, 1924, at the office of Dr. N. A. Kippen, Independence, Iowa.

Officers were elected as follows: President, Dr. N. A. Kippen, Independence; Secretary-Treasurer, Dr. L. A. Mosher, Independence.

Plans for the coming meeting of the A. V. M. A. in Des Moines were discussed.

The July meeting was held at the Gedney Hotel, Independence, July 2, 1924, with seventeen veterinarians present from Buchanan and adjoining counties.

Participating in the program were: Dr. White, a representative of the Horse Association of America; Dr. Virgil Benedicto, of Havana, Cuba; and Dr. E. R. Steel, Secretary of the Iowa Veterinary Association.

BIG SIX (IOWA) VETERINARY ASSOCIATION

The second annual meeting of the Big Six Veterinary Association was held at the Commercial Club, Sheldon, Iowa, June 13, 1924. Twenty-one members were in attendance, representing the following Iowa counties: Sioux, Lyon, Osceola, Clay, Dickin-

son and O'Brien. Dr. L. U. Shipley, of Sheldon, and Dr. L. W. Kellogg, of Hull, are President and Secretary, respectively, of this active organization.

Have You Secured One New Member This Year?

**NORTH CENTRAL IOWA VETERINARY MEDICAL
ASSOCIATION**

A very successful meeting of the North Central Iowa Veterinary Medical Association was held on June 19, at Fort Dodge, the meeting being called to order by the president, Dr. C. W. Anderson, of Jewell, Iowa.

A paper of scientific interest and practical importance was presented by Dr. E. M. Nighbert, B. A. I., Queen City, Mo., on "The Control of Stomach Worms in Sheep." Dr. C. E. Juhl, of Osage, Iowa, gave his experience in treating a condition noted in calves fed for the production of baby beef. Dr. F. L. Buck, of Grand Junction, Iowa, presented to the Association observations gained in an extensive poultry practice. A general discussion followed the reading of these papers.

Dr. H. E. Bemis, Chairman, Committee on Local Arrangements for the A. V. M. A. meeting in Des Moines, spoke before the Association and stated that every indication pointed to the most successful meeting in the history of the national association.

In the evening, the membership, ladies, and friends were entertained by the Fort Dodge Serum Company, at a banquet, at which time addresses were made by Dr. M. J. Kenefick, Algona, Iowa, and Dr. H. E. Bemis, Ames, Iowa. Dancing followed.

H. J. SHORE, *Secretary*.

Does Your Wife Know About The Women's Auxiliary?

**NORTHEASTERN INDIANA VETERINARY
ASSOCIATION**

The Northeastern Indiana Veterinary Association met at Tri-Lake, near Columbia City, Ind., June 19, 1924. The members and their wives were the guests of Dr. and Mrs. H. M. Clark, at their cottage. It was Dr. Clark's birthday. About ninety were present and partook of a pot-luck dinner. The next meeting will be held in Kendallville, in August.

WHITE RIVER (IND.) VETERINARY MEDICAL SOCIETY

Twenty-five members of the White River Veterinary Medical Society, with their families, met at the "ole swimmin' hole," four miles west of Oaktown, Ind., June 20, 1924, for an all-day meeting and picnic.

Among those present were Dr. J. E. Gibson, of Indianapolis, B. A. I. inspector-in-charge of hog cholera control and tuberculosis eradication; Dr. W. B. Craig, of Indianapolis, assistant state veterinarian; and Dr. J. L. Donaldson, of the Indiana Live Stock Association.

The next meeting will be held at Washington, Ind., in September.

Have You Secured One New Member This Year?

**MICHIGAN STATE VETERINARY MEDICAL
ASSOCIATION**

Three days crammed full of something for everybody only inadequately describes the forty-second annual meeting of the Michigan State Veterinary Medical Association, at East Lansing, Mich., June 24-25-26, 1924. About 150 veterinarians were in attendance, with quite a large number of the fair sex present.

The morning session of the first day was given over to laboratory demonstrations, thirty minutes being devoted to each of the following subjects:

Blood tests for bacillary white diarrhea.

Dr. H. J. Stafseth.

Agglutination test for abortion.

Prof. I. F. Huddleson.

Examination of fecal matter for parasites.

Prof. W. L. Chandler.

Methylen-blue and hydrogen-ion milk tests.

Prof. L. H. Cooledge.

Examination of brain for presence of Negri bodies.

Actinomycosis.

Dr. E. T. Hallman.

The afternoon program was started with a business section, Dr. Killham presiding. Prof. R. S. Shaw, Acting President of the Michigan Agricultural College, delivered the address of welcome and Dr. W. N. Armstrong, of Concord, responded. Following President Killham's address several business matters

were disposed of, including the admission of twenty-one new members.

Following the business session, papers were read and discussed as follows:

"Field Investigations of Swine and Poultry Tuberculosis," Dr. W. H. Beck, U. S. B. A. I., Lansing.

Discussion was led by Dr. A. B. Curtice, of Hillsdale.

"The Live Stock Situation in Great Britain and the Channel Islands," Prof. O. E. Reed, Dairy Dept., M. A. C.

"Rabies," Dr. A. S. Schlingman, Medical Research Dept., Parke, Davis & Co., Detroit.

Discussion was led by Dr. E. E. Patterson, of Detroit.

A question box followed, ably conducted by Dr. J. E. Wurm, of Pigeon.

The evening was spent at the M. A. C. Gymnasium, supper being served around the swimming pool. Hon. H. H. Halladay, Secretary of M. A. C., addressed the gathering.

Dr. F. W. Schofield, of the Ontario Veterinary College, Guelph, Ontario, delivered an illustrated lecture, "Glimpses of Life in Korea and Japan." This proved to be intensely interesting. Dr. Schofield's style of presenting his subject made a big hit, and everyone was sorry when the last slide was thrown upon the screen. A dance in the gymnasium followed.

Wednesday morning the program was started with two illustrated lectures:

"Anatomy of the Chicken," by Dr. H. E. Johnson.

"Embryology of the Chick," by Dr. F. W. Chamberlain.

Professor C. F. Huffman then addressed the meeting on "Depraved Appetite, Its Cause and Prevention." This subject was closely tied in with the subject of nutrition, and Prof. Huffman described the nutrition experiments which are being conducted at M. A. C., illustrating his remarks with photographs, skiagraphs, charts, and specimens of various mineral feed supplements.

A clinic followed, in charge of Dr. C. J. Stowe, of Stockbridge.

The afternoon session was opened by an address by Dr. Reuben Hilty, of Toledo, Ohio, on "The Needs of the Veterinary Profession." Among the points stressed by Dr. Hilty were the need for better support of our veterinary colleges, the desirability of more harmonious cooperation between regulatory officials and practitioners, and the value of higher professional standards for the veterinarian. Dr. Hilty did not hesitate to call a spade a

spade on several occasions, and his frankness in this respect was very well received.

Dr. Schofield then took his second turn on the program, his subject being, "Damaged Sweet Clover, the Cause of a Serious Disease in Cattle." It was presented in Dr. Schofield's usual interesting fashion, and those present felt that they had had a rare treat. Dr. Killham reported that the disease had been observed in Michigan, and warned the veterinarians present to be on the lookout for it.

The latter part of the afternoon was spent at Park Lake, where sports were indulged in and a picnic supper served, followed by dancing. In a well-played ball game the Scientifiers defeated the Practitioners, 20-15.

Thursday the program was given over to representatives of the eight local associations in Michigan, each having agreed to contribute to the symposium. The following papers were presented:

Southeastern Michigan Vet. Med. Asso.

"Practical Measures in the Control of Abortion Disease and Its Sequelae," by Dr. L. H. Smith, Mt. Clemens.

Michigan-Ohio Vet. Med. Assoc.

"Unusual Case Report," by Dr. W. E. Watson, Metamora, Ohio.

Western Michigan Vet. Med. Asso.

"Canine Distemper and Its Complications," by Dr. M. R. Thynge, Grand Rapids.

Southwestern Michigan Vet. Med. Asso.

"An Undiagnosed Condition of the Cow," by Dr. John Schaefer, Bangor.

Central Michigan Association.

"Conditions That We Meet in Practice," by Dr. F. W. Main, Albion.

Thumb Vet. Med. Association.

"Strongylosis in the Horse," by Dr. M. J. Geiger, Croswell.
Report on difficult operation, by Dr. Geo. McIntyre, North Branch.

Capitol Vet. Med. Association.

"Country Practice as I Find It," by Dr. L. A. Wileden, Mason.

Saginaw Valley Vet. Med. Asso.

Postmortem on a dog having shown symptoms of a progressive paralysis of the jaws, by Dr. L. A. LaFond, Flint.

Dr. H. Preston Hoskins, Secretary of the A. V. M. A., called the attention of the members to the report of the A. V. M. A. Committee on Policy and suggested that the Association take some action on it. After a brief discussion a motion prevailed unanimously endorsing the proposed policy.

Honorary membership was conferred upon Dr. E. P. Schaffter, B. A. I. inspector-in-charge, at Detroit, and Dr. Reuben Hilty, of Toledo, Ohio. An amendment to the constitution was offered, providing for the creation of life membership in the Association, contingent upon twenty-five years of continuous membership, life members to be exempt from dues, but to enjoy all other privileges of membership.

The election of officers resulted as follows: President, Dr. H. Preston Hoskins, of Detroit; First vice-president, Dr. F. E. Stiles, of Battle Creek; Second vice-president, Dr. W. E. Coomer, of Bay City; Third vice-president, Dr. L. A. Wileden, of Mason; Secretary-Treasurer, Dr. E. K. Sales, of East Lansing; member of Board of Directors (for six years), Dr. J. E. Wurm, of Pigeon.

E. K. SALES, *Secretary.*

Does Your Wife Know About The Women's Auxiliary?

MISSOURI VETERINARY MEDICAL ASSOCIATION

The thirty-third annual meeting of the Missouri Veterinary Medical Association was held on the Roof Garden of the Royal Hotel, Excelsior Springs, Mo., June 25-26, 1924, President R. Logan Allen presiding. The address of welcome was given by a representative of the Chamber of Commerce, to which Dr. J. T. Jenneman, of St. Louis, responded.

Several interesting papers were given and these brought forth good discussions, among them being "Sterility," illustrated with slides, by Dr. W. L. Boyd, of the University of Minnesota; and "Rabies," with motion pictures of rabid dogs in action, by Dr. J. C. Flynn, of Kansas City. Dr. Flynn gave a short talk, at a local picture show, for the benefit of the public, and the film was run in conjunction with his talk.

Dr. Sivert Eriksen, of the Mountain Grove Poultry Experiment Station, gave "Diseases of Poultry," illustrated, which was highly interesting. Dr. E. M. Nighbert, of Queen City, Mo., Zoological Div., B. A. I., presented "Stomach Worms of Sheep," which brought forth much discussion and interest.

Dinner was served to about one hundred guests at the Royal Hotel, at 6:30 p.m., Vice-President J. L. Jones presiding. There were several speakers, the principal one being Dr. C. H. Stange, President of the American Medical Veterinary Association. He urged individual efficiency on the part of veterinarians everywhere and thus the destiny of the veterinary profession would be secure.

Four resolutions were passed, two of which are of general interest.

RESOLUTION NO. 2

WHEREAS, rabies has been prevalent among the dogs of Missouri and surrounding States, the past few years, causing much anxiety, danger to the lives of our people, as well as the outlay of much money for protection and great financial loss to live stock owners, and

WHEREAS, science has provided a safe and comparatively inexpensive method of immunizing dogs against rabies, that, if applied to all dogs, would practically eliminate this great danger, expense and loss to our live stock industry, and

WHEREAS, it is well known that rabies is an acute disease, often developing when least expected, and knowing that rabid dogs wander many miles from home and are liable to do great damage to their owners and their immediate neighbors as well as those at a distance, and believing that all the people of the State deserve legislative protection from all the dogs of the State, and

WHEREAS, our present laws are effective only by authority of certain local officials and do not protect either the citizens of such localities from danger from without, or the citizens of surrounding communities from the dangers of the infected neighborhood, therefore, be it

RESOLVED, that the President of this Association be instructed to appoint a committee of three to correspond with the humane, medical, live stock and other associations and boards of health, with a view to procuring their assistance in formulating and procuring such legislation as will effectually protect all the citizens of our State against the ravages of mad dogs.

RESOLUTION NO. 4

WHEREAS, the eradication of bovine tuberculosis has become the most important project in connection with the live stock industry, and

WHEREAS, it is apparent that the statutes of Missouri do not at present provide a business-like, legal procedure to the end that Missouri countries may be made modified accredited tuberculosis-free areas, therefore, be it

RESOLVED, that we, the officers and members of the Missouri Veterinary Medical Association, do favor such new legislation as will make the accrediting of Missouri counties a practical and business-like proceeding, and in order that the farmers and live stock owners of the state may receive the many benefits that accrue in the better health of our cattle, swine and poultry, and the advanced prices that the live stock is bringing in accredited areas, especially the ten-cents-per-hundred premium that the packers are now paying for all hogs bred and fed in such areas, and be it further

RESOLVED, that copies of this resolution be given the public press and farm journals of the State.

A. T. KINSLEY,
A. D. GLOVER,
J. R. SHIKLES,
Committee.

The meeting adjourned, to return to Excelsior Springs next year, after an election of officers was held: President, Dr. J. L.

Jones, Blackburn; Vice-President, Dr. J. C. Flynn, Kansas City; Trustee, 2nd District, Dr. A. T. Kinsley, Kansas City; Secretary-Treasurer, Dr. Fred C. Cater, Sedalia.

FRED C. CATER, *Secretary.*

Have You Secured One New Member This Year?

ARKANSAS VETERINARY MEDICAL ASSOCIATION

The Arkansas Veterinary Medical Association convened, June 28, 1924, at the Marion Hotel, Little Rock, with Dr. I. Peters presiding. He spoke briefly of the changed conditions of veterinary practice and the importance of the veterinarian meeting them. He cited the importance of a legislation committee. It was moved and seconded that the Secretary notify members of any contemplated legislation adverse to the veterinary profession and to advise them to use their influence to defeat such bills.

Dr. Hubert Shull's remarks on "The Veterinarian's Relationship to the Chamber of Commerce and Civic Organizations" covered many phases of the veterinarian's activities along this line that redound to his financial benefit. This was discussed by Drs. Wilson and Peters.

Dr. H. W. Wilson, of Helena, presented a carefully prepared paper on "Necrotic Dermatitis," reporting on a line of treatment for this condition which for him has been very satisfactory. This was discussed by Drs. Williams and Hodgens.

Dr. John M. Hodgens, of Morrillton, discussed foot troubles commonly encountered in veterinary practice in Arkansas, which was favorably commented on and discussed by Dr. R. C. Moore, of St. Joseph, Mo.

A paper was read by the Secretary, prepared by Dr. S. J. Schilling, Fayetteville, entitled, "Improving the Relations between the Public and the Veterinarian." This received much favorable comment and was discussed by Drs. Moore, Bux and Shull.

The election of officers resulted in the following: Dr. R. W. Williams, El Dorado, President; Dr. H. W. Wilson, Helena, Vice-President; Dr. Hubert Shull, Texarkana, Secretary-Treasurer.

It was moved by Dr. Johnson, seconded by Dr. Driver, that the President and Secretary-Treasurer decide upon the next

meeting date and place. It was voted that the Secretary write a letter of thanks to Jensen-Salsbery Laboratories for the attendance of their representative, Dr. R. C. Moore.

The meeting adjourned at 12:30 and re-convened at 1:30 p. m., at Dr. Osborne's Veterinary Hospital, where a small animal clinic was conducted by Dr. R. C. Moore. Dr. W. C. Glockner conducted an autopsy on two pigs previously injected with hog cholera virus, demonstrating the lesions of hog cholera.

There being no further business, the meeting adjourned.

J. H. BUX, *Secretary.*

We Have Room For A Thousand New Members This Year.

MAINE VETERINARY MEDICAL ASSOCIATION

The quarterly meeting of the Maine Veterinary Medical Association was held at the DeWitt Hotel, Lewiston, Maine, July 10, 1924. A shore dinner was served at noon, at the Tacoma Inn; a postmortem clinic held at the E. W. Penley plant, Dr. L. K. Green in charge, in the afternoon; and the business session in the evening.

The shore dinner was well attended and all voted Tacoma Lake as one of the most beautiful spots in the State. After resting under the beautiful pines that fringe the lake, the party proceeded to the Penley Abattoir, at Auburn, Maine, where Dr. L. K. Green, U. S. Inspector-in-Charge, gave a very educational and practical demonstration of postmortem work. Bovine tuberculosis infection was shown in several cases. The E. W. Penley Company gave each visitor a pound package of their selected sausage as a souvenir.

The evening meeting was attended by the President, Dr. E. E. Russell; the Vice-President, Dr. C. L. Ryan; Hon. H. M. Tucker, Chief, Division of Animal Industry; Prof. O. A. Wilbur, of the University of Maine; and the following Maine veterinarians: Drs. Geo. Inglis, L. E. Maddocks, M. E. Maddocks, W. H. Robinson, E. B. Beals, W. H. Corey, C. W. Watson, H. B. Wescott, Carl Davis, A. J. Neal, L. K. Green, and J. B. Reidy.

A letter from Dr. P. R. Baird, Secretary-Treasurer, was received, stating that due to pressure of private business matters he desired to be relieved from the duties of Secretary-Treasurer. It was duly moved, seconded and carried to accept Dr. Baird's resignation. Dr. L. E. Maddocks was elected temporary

secretary, and it was moved, seconded and carried to instruct the Secretary to cast one ballot for Dr. A. J. Neal as Secretary-Treasurer, to take Dr. Baird's place.

Hon. H. M. Tucker, Chief of the Division of Animal Industry, who is a very successful breeder of Rhode Island Red chickens and a former pure-bred Jersey breeder, was called on for a talk on poultry. He stated that he thought the veterinarians would be interested in the breeding end of that subject and proceeded to give a very interesting and instructive talk. If a poultry owner used his gray matter in the selection of mates whose vitality is high and other desirable qualities proven, there is not only no danger attached to inbreeding, but it is very desirable in building up a money-making flock of chickens.

Mr. Tucker cited a case in Maine, where a noted White Leghorn breeder had, for the past thirty years, used only birds raised on the place, in his breeding, and had thus built up one of the leading flocks in the United States. He advised the use of setting eggs from producers only, in the early stages of the egg-laying period, before the birds' vitality would be reduced by the strain. He also advised keeping the male with the hens and since there are some hens that the flock rooster will not mate with, an extra rooster might be of service.

Prof. O. A. Wilbur, of the University of Maine, gave a very practical talk on poultry diseases. He stated that bacillary white diarrhea was the greatest menace to poultry, while coccidioidis, poultry paralysis and tapeworms did considerable damage to flocks in Maine. The treatment for the various troubles was also discussed by him.

Drs. Maddocks, Wescott, Beals, Davis and Robinson discussed the problem of the quack who illegally plies his trade.

Newport, Maine, was selected as the place of the next quarterly meeting and Dr. Corey promised a good clinic at that time for those attending.

J. B. REIDY,
Res. A.V.M.A. Sec. for Maine

Plan To Go To Des Moines, August 19-22.

**WESTERN NEW YORK VETERINARY MEDICAL
ASSOCIATION**

The eleventh semi-annual meeting of the Western New York Veterinary Medical Association was held July 10, 1924, at

Akron, N. Y., the Association being the guest of Dr. J. L. Wilder, of that place.

The meeting opened with a luncheon at 1 p. m., after which clinics were held, consisting of an operation for roaring, performed by Dr. J. N. Frost, of Ithaca, N. Y.; a demonstration of ear cropping, by Dr. F. E. McClelland, of Buffalo, N. Y.; ovariotomy on two bitches, by Drs. McClelland and Fehr, of Buffalo, N. Y.; caponizing of chickens, by Dr. L. Fridez, also of Buffalo; and the diagnosis and observation of a cow with a perineal rupture producing a hernia of the bladder.

A business session was then held and after the roll-call and reading of the minutes the unfinished business of the previous meeting was taken up, viz: the adoption of the schedule of prices presented at that meeting. Three new members were admitted to the Association, several communications were read and disposed of and the meeting then adjourned to the Automobile Club, at Clarence, N. Y., where dinner was served to the members and their families, covers being laid for sixty-six.

After the dinner the members reconvened and the papers and addresses were taken up. The first paper of the evening was read by Dr. Benjamin Roman, M. D., Director of Laboratories, Buffalo General Hospital, his subject being, "Pathological Changes of the Nervous System in Canine Distemper." A lengthy discussion followed, when, owing to the lateness of the hour, the other papers were held over to the next session and the meeting adjourned, closing one of the most pleasant and successful meetings ever held by this Association.

F. F. FEHR, *Secretary.*

Does Your Wife Know About The Women's Auxiliary?

MIXING IT UP AT EVANSTON

A mixed court recently tried the first case of violation of the Evanston (Ill.) dog-muzzling ordinance. An English bulldog, owned by a Swede, attacked a Chinese Chow, owned by a German. A police officer (originally from Luxemburg) made the arrest and an Irish attorney prosecuted the case before an Austrian-born justice-of-the-peace. The defendant was fined five American dollars when it was established that the bulldog was not muzzled. A Pennsylvania Dutch reporter chronicled proceedings, according to the report.

ARMY VETERINARY SERVICE

THE DEFENSE TEST

The President of the United States has designated September 12, 1924, the sixth anniversary of the Battle of St. Mihiel, as the day to commemorate the achievements of the American participation in the World War. A practical demonstration of the national progress in the fulfillment of the defense program will be held on that day.

Human nature and the instinct of self-preservation are the same today as in ages past. Wars will occur, however much we deplore them. Our history shows that unpreparedness at the beginning of every war, none excepted, has necessitated a reckless expenditure of money, materials, and personnel. At the beginning of these emergencies the cost was not considered, we had to act and to act quickly. "Win the war" was the one purpose and all others were made subordinate thereto. The delay, confusion, duplication of effort, inefficiency and expense, bred by lack of foresight and preparation, both during and after each emergency, have imposed heavily upon every citizen and the price has been paid by all.

Profiting by our past experience, Congress has enacted a National Defense Act. The law provides that it shall be the duty of the War Department: "to prepare plans for National Defense and the use of the military forces for that purpose, * * * and for the mobilization of the manhood of the nation and its material resources in an emergency * * *."

The War Department, after months of work, has progressed to a point where it is desirable to "take stock." It is obvious that plans, covering the many details relative to personnel, equipment, hospital and sanitary service, and other questions directly affecting the life and prosperity of every citizen, must be revised more than once before they have reached a satisfactory stage. September 12, 1924, has accordingly been fixed upon as the date to analyze our defense plans and enable the War Department to apply remedies where indicated. The plans are not secret, because the methods of organization and the success of the system require a full understanding by the people and the cooperation of communities and the voluntary action of individuals.

The Defense Test will be a demonstration of the Army's mobilization plans to the Army's owner, the citizens of the United States of America. The proposition is to call a meeting of the stockholders on September 12, such as the board of directors of every business concern calls from time to time, and inform the American people of the plans and methods by which American armies will be raised and maintained in the event of a future national emergency. This can be done without fear or prejudice, because we have no hostile purpose toward any nation or people.

The Defense Test will be simply the assembling of the Regular Army, the National Guard, and the Organized Reserves in their home communities, in much the same manner our forefathers did in the American Revolution. It will introduce to our people the new Army of the United States, and will impress upon them the fact that it is theirs and will be ready for whatever expansion needed to meet any particular emergency.

The people will see that the Army, in its skeleton form, consists of divisions that served during the World War and that they belong to the various states and sections which contributed the largest numbers of them during the conflict. The people should know that the Nation's defense plans rest primarily upon community effort, that the means of protection has been equally and equitably distributed amongst all communities, that each will be called upon to perform a given task, that each shall know what that task will be, and that each shall feel a sense of pride in the Army as a whole and of ownership and pride in the units to be supported by them.

In addition to this, each individual officer, man and nurse will be impressed with his particular function if war comes. The idea is to suggest to officers their respective duties and enable them to visualize the problem for themselves and thus avoid, should the emergency come, the confusion and the lost motion before we can get under way.

The Organized Reserves will constitute the great bulk of our citizen army in a national emergency. The Test will consequently mean much to Reserve officers and to the Army component represented by them. It brings before them the necessity for a working knowledge of their duties in the event of a real mobilization, questions of recruiting, shelter, equipment, supply, sanitary measures, training and other essentials in mobilization.

The necessity for the wholehearted and active interest of Reserve officers in this project cannot be over-emphasized.

Members of the veterinary profession who have not yet enrolled in the Officers' Reserve Corps are earnestly urged to do so at once, and all should participate in the Defense Test and community patriotic demonstrations which will be held on September 12, 1924.

AT FORT SNELLING

The following officers of the Veterinary Reserve Corps were ordered to Fort Snelling, Minn., for a fifteen-day training period, with the Provisional Medical Regiment: Lt. Col. G. C. Miller, in charge of Veterinary Company; Lt. Col. N. S. Mayo, assigned to Headquarters; Capt. J. J. Roberts, Capt. H. B. Giles, Capt. H. W. Tornow, 1st Lt. B. L. Candill, 1st Lt. D. H. Bibens, 1st Lt. E. N. Davis, 1st Lt. J. R. McIllra, 1st Lt. H. E. Stearns, 1st Lt. H. P. Stout, 1st Lt. H. W. Knoenschild, 2nd Lt. L. E. Long, 2nd Lt. V. M. Kaliher and 2nd Lt. A. J. Matter.

The Veterinary Company, which also contains a number of officers of other branches of the Medical Department, is commanded by Capt. L. R. Smith and is considered by all to be the best drilled company here. A sketch of the work will appear in a later number of the JOURNAL.

N. S. M.

MINNESOTA COMBINES SHORT COURSE WITH STATE MEETING

The summer meeting of the Minnesota State Veterinary Medical Association will be held at University Farm, August 14-15, 1924, and will be in the nature of a two-day short course under the auspices of the University of Minnesota.

Secretary Fitch has obtained some splendid talent for the program, including Dr. John W. Adams, of the University of Pennsylvania; Dr. D. H. Udall of Cornell University; Dr. C. E. Juhl, of Osage, Iowa; Dr. C. H. Case, of Akron, Ohio; Dr. J. C. Flynn, of Kansas City, Mo.; Dr. J. A. Kiernan, of Washington, D. C.; and Dr. E. B. Forbes, of Pennsylvania State College.

Entertainment is being provided for the ladies. The college dormitories will be available for the visiting veterinarians and their families, as will also the cafeteria, so that it will not be necessary to go off the campus during the time of the meeting.

COMMENCEMENTS

CORNELL UNIVERSITY

The fifty-sixth annual Commencement of Cornell University took place June 16, 1924. Thirteen members of the graduating class received the degree of Doctor of Veterinary Medicine:

Maurice De Graff Canary
John Baird Cheney
William Rush Crawford
Howard John Foote
Clyde Lewis Kern
George Horace Ludins
Ralph Earl Whiting

Harold Benjamin McMurray
Telford Simpson Miller
Maynard Harold Mires
John Victor Nevitt
George Lauder Stringham
Theodore Fred Taylor

The following members of the senior class received their degrees February 6, 1924:

Clayton Earl De Camp

Robert Mathias Miller

The following prizes were awarded for the academic year, 1923-24:

The Horace K. White Prizes:

First Prize.....	George Horace Ludins
Second Prize.....	John Baird Cheney
<i>The Hollingworth Honorarium.....</i>	Telford Simpson Miller
<i>The James Gordon Bennett Prize.....</i>	George Lauder Stringham

The Jane Miller Prizes:

First Prize.....	Walter Joseph Gibbons
Second Prize.....	Richard Vincent Gibbons

Does Your Wife Know About The Women's Auxiliary?

MICHIGAN AGRICULTURAL COLLEGE

Commencement exercises were held at the Michigan Agricultural College, June 16, 1924. Six members of the graduating class received their veterinary degrees:

Niley D. Bailey
Don R. Coburn
Alex. L. Copland

John R. Harney
Clyde R. Peterson
Andrew Uren

At the close of the 1923 summer term, the degree of Doctor of Veterinary Medicine was conferred upon

Kendall Eli Merlau

and at the close of the 1923 winter term upon

Leslie John Heiden.

Plan To Go To Des Moines, August 19-22.

UNIVERSITY OF GEORGIA

The University of Georgia observed its 125th Commencement Day on June 27, 1924. Five men received the degree of Doctor of Veterinary Medicine.

A. E. Drexel
S. H. Exley
W. F. McLendon

A. J. Shirley
A. J. Trawick

Four of these men received honors from the University or at the hands of the student body, as follows:

A. E. Drexel is a member of the following honorary societies: Alpha Zeta, Phi Kappa Phi, Gridiron and Aghon. He has for three years been Editor-in-Chief of the *Georgia Agriculturist*, and during his senior year was Cadet Lt. Col. of the R. O. T. C. at the University of Georgia.

A. J. Trawick is a member of the following honorary societies: Alpha Zeta and Aghon. In his senior year he was President of the local Saddle and Sirloin Club. He was the holder of a scholarship, given by the Virginia-Carolina Chemical Company, for proficiency in his studies.

S. J. Shirley is a member of Aghon Society, a member of the Student Council (the governing body among the students of this university) and was a member of the Live Stock Judging Team of this College.

S. H. Exley was, in his junior year, President of the Saddle and Sirloin Club. He was Captain in the cavalry unit of the University of Georgia R. O. T. C.

W. F. McLendon has been elected house surgeon by the faculty of this school for the coming year.

We Have Room For A Thousand New Members This Year.

UNIVERSITY OF PENNSYLVANIA

At the commencement exercises of the University of Pennsylvania, held on June 18, the degree of Doctor of Veterinary Medicine was conferred upon the following graduates:

Arthur Louis Brueckner
Thomas Jefferson Gasser
James Seely Hogg

James Hendricks Spence
Fred Dickson Wood

The commencement address was made by Dr. Walton Brooks McDaniel, professor of Latin, and the degrees were conferred by President Josiah H. Penniman.

The J. B. Lippincott Prize of \$100 offered to the student

who, in the four years' course, obtains the highest general average, was awarded to James Hendricks Spence, and the Jeannette Blair Prize of \$50, offered to the student doing the best work in the Small Animal Clinic, was awarded to Fred Dickson Wood.

Dr. Wood has been appointed the Resident Veterinarian of the Veterinary Hospital for one year beginning July 1. Dr. Arthur L. Brueckner has received an appointment to a position in the Pennsylvania State Bureau of Animal Industry Laboratories, and the other three men have arranged to engage in general practice.



Tablet in Honor of Univ. of Penna Veterinary Alumni Who Served in the World War.

At the annual meeting of the alumni of the School of Veterinary Medicine, University of Pennsylvania, June 14, a bronze tablet containing the names of the alumni of that school, who served in the World War, was unveiled in their honor. The tablet contains two hundred seventeen names, or more than 30% of the alumni living at that time, and was erected by their fellow alumni. The tablet was presented to the University, on behalf of the alumni, by Dr. W. A. Haines ('07), Bristol, Pa., and was accepted for the University by Mr. J. Hartley Merrick, Vice-

Provost. Special tribute was paid to Drs. Horace M. Baker ('08) and Wilbur C. Kreamer ('16), who lost their lives in the service.

Dr. C. H. Stange, President of the A. V. M. A., was present at the alumni gathering. He was a welcome visitor, his remarks were timely and enjoyed by all. It is hoped by all Pennsylvanians that he can be a more frequent visitor.

Dr. Jaime Bagué ('14), Sub-Commissioner of Agriculture and Labor, San Juan, Porto Rico, in this country to study the organization of the Federal and State Agricultural Departments, was among those who participated in the Alumni Day exercises.

The attendance at the Alumni Day exercises was the largest in the School's history. The class of '09 celebrated its fifteenth anniversary and the class of '14 its tenth, a very large proportion of these men being present. Prizes were awarded as follows:

1. Oldest alumnus, Dr. Charles Williams ('87), Philadelphia, Pa.
2. Greatest distance traveled, Dr. Harry W. Jakeman ('09), Boston, Mass.
3. Class having largest attendance, 1914.

TEXAS A. & M. COLLEGE

Two members of the 1924 graduating class at the Texas Agricultural and Mechanical College received the degree of Doctor of Veterinary Medicine:

Philip Smith

J. W. Williamson

We Have Room For A Thousand New Members This Year.

FOOT-AND-MOUTH DISEASE IN ENGLAND

According to a recent report in the *British Medical Journal* the net expenditure, from the middle of August, 1923, until the first of May, 1924, in attempting to control the outbreak of foot-and-mouth disease, is given by the Minister of Agriculture as 3,188,250 pounds. Nearly 200,000 animals have been slaughtered, representing 1.4% of the total cattle, 1.7% of the total pigs, and 0.2% of the total sheep in Britain. When it is remembered that outbreaks occur only in certain areas, the local loss in some must have been enormous, and the extra cost of re-distribution of meat and milk very considerable.

N. S. M.

MISCELLANEOUS

PRACTITIONERS IN IOWA COOPERATE

Dr. E. R. Steel, the energetic secretary of the Iowa Veterinary Association, has been making strenuous efforts to have local practitioners used as much as possible in the work of tuberculosis eradication in Iowa. He has not lost sight of the fact that the practitioner has a responsibility to discharge, and does not hesitate to call attention to this fact, as is shown by the following copy of a letter he recently wrote to each member of the Association:

In the county area plan of eradicating tuberculosis in Iowa, the cooperation of practitioners is needed and their services will be recognized. Reports have come in showing that in some counties the practitioners have not shown the interest in this movement they should. When a county meeting is called to consider the plan, as many practitioners as possible should attend. Assistance in publicity work at the local meetings over the county, the giving of advice in the appointment of suitable parties to take around the petitions, instructing these men as to tuberculosis and the details of the tests and any other help offered will be appreciated. The use of your office by the county tuberculosis inspector while working in your community, after the plan is adopted, will probably be very acceptable to him. Whether you assist in the testing or not, your cooperation should be given.

After the plan is adopted, in order that practitioners may help in the work, it is necessary that a sufficient tax levy be made by the county supervisors to meet all needs. Data will be furnished by the Iowa Department of Agriculture as to what this should be for your county. All money raised by taxation for this work must be used for it only; so that ample funds should be secured by the first levy, the limit being a three mill tax. Your cooperation in seeing that this levy is adequate to complete the work as soon as possible is urged, for it may be impossible for practitioners to work if this is not done.

The plan for conducting the tests is that a county tuberculosis inspector is hired by the state to organize the testing, run tests, and be in charge of all other veterinarians testing in the county in area work. Accredited practitioners may help if they can work four days or more of any week, according to present requirements, altho the plan of letting them work a minimum of two days a week or one day a week for injecting and another for reading the reactions, will be tried out and followed if advisable. Practitioners receive \$10.00 per day, 7c per mile travel by car, and tags and tuberculin furnished. The Iowa Department of Agriculture advises that practitioners be given townships or school districts nearest them to clean up so that mileage is shortened and more cattle tested than if working at a distance. Since no state or federal funds can be used for the employment of practitioners, they can't work until county funds become available, unless warrants from the county supervisors are taken which can be cashed later when the county funds become available. This matter should be taken up with the supervisors direct. The local accredited veterinarians under the county area work secure their appointments through the recommendation of the county inspector in charge and all records of their work will come to the department of agriculture through the county inspector.

Assisting in the testing, besides the financial remuneration you receive, will give you valuable experience, recognition in your community, help in turning back of the testing into the hands of the practitioner when the herds are accredited and the area testing is completed. An efficiency record is kept

on every man's work and upon this record the use of practitioners will depend. By comparing your record with that of the county tuberculosis inspector working under similar conditions you may know what you are required to do.

In each county adopting the area plan, a committee is formed consisting of the inspector in charge, a member, or someone representing the board of supervisors, the county agent, some man selected in the county to represent the county live stock interests and a representative of the local veterinarians. I advise that the veterinarians of the counties adopting the area plan meet and form a county organization so that this work as well as other matters can be given consideration in an organized manner. It is not necessary to have a constitution and by-laws and have regular meetings unless desired. Send me the name of the representative elected for the tuberculosis committee so that this office can keep you informed of developments. It would be well, in counties that have not yet adopted the area plan, to form a county organization so that you will be prepared to act as a body. I assure you also that your State Association will be of more value to you if this is done. One of the immediate questions your representative on the county tuberculosis committee can take up for you is the supplying through the local veterinarians of an approved disinfectant for use in cleaning up following the finding of reactors.

A questionnaire on Bovine Tuberculosis Eradication issued by the Iowa State Department of Agriculture has been sent you by that department and it contains information every veterinarian should know. For any other information you may wish concerning the conduct of the area testing, write Secretary R. W. Cassaday, Department of Agriculture, Des Moines, Iowa. I assure you he will give you fair and careful consideration.

Yours sincerely,

E. R. STEEL, *Secretary-Treasurer.*

TO ENCOURAGE BETTER SHIPPING METHODS

A handsome trophy will be awarded by the National Live Stock Producers Association to the live stock shipping association which sustains the smallest percentage of loss on shipments in transit during the period from July 1 to December 31, 1924. "An association must ship a minimum of 20 cars, to any one of the 13 terminal cooperative selling agencies, belonging to the National Producers, to compete for the award," says C. A. Stewart, executive secretary of the National Live Stock Producers Association. "The rating will be made on the basis of percentage of loss or damage of the net value of the shipment. It is expected that each of the producers' commission companies will offer an additional trophy for shipments consigned to them."

FEWER PIGS THIS YEAR

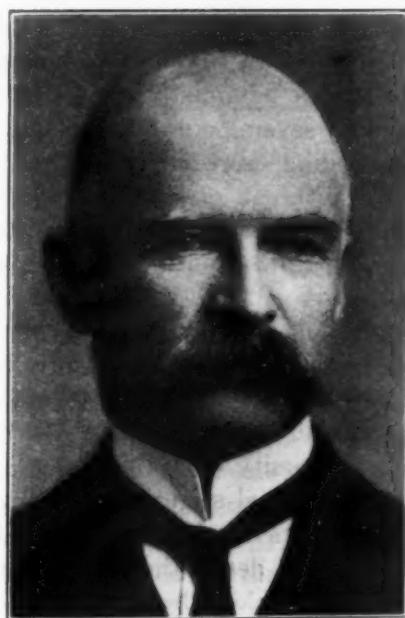
A decrease of about 8,000,000 pigs in the 1924 spring crop in the Corn Belt is indicated in the June pig survey of the United States Department of Agriculture, announced July 3. The survey shows that the flood of hog production, in the Corn Belt, that reached its height in the spring pig crop of 1923, is now rapidly receding and has about reached a normal level, according to the report.

NECROLOGY

FRED TORRANCE

Dr. Fred Torrance died suddenly, at Guelph, Ontario, June 29, 1924.

Born at Montreal, July 13, 1859, Dr. Torrance attended McGill University, from which institution he received the degree of Bachelor of Arts and Doctor of Veterinary Science, the latter in 1882. Following his graduation Dr. Torrance located in general practice, at Brandon, Manitoba. At that time Brandon was largely a city of tents, as the Prairie Provinces were then just



DR. FRED TORRANCE

becoming settled. He passed through all the vicissitudes of pioneer life and became widely known in the community in which he grew up and established a large general practice. He married Miss Julia Jarvis, who now survives him, together with a son and daughter, the former being Major P. V. Torrance, of Winnipeg, Manitoba, and the latter, Mrs. S. Sherwood, of Ottawa, Ontario.

During the year 1892 Dr. Torrance moved from Brandon to Winnipeg, where he rapidly built up a large practice and was

frequently called in consultation by other practitioners in the Province; in fact he soon became known as a wise guide and counsellor to the veterinarians throughout the Province and enjoyed the friendship and esteem of the entire profession. His was a likable personality and one always heard him spoken of as a true gentleman in the fullest sense of the term.

On August 1, 1912, Dr. Torrance became Veterinary Director-General of Canada, succeeding the late Dr. J. G. Rutherford and serving until about one year ago. Under the leadership of Dr. Torrance, as Veterinary Director-General, dourine was eradicated from the Western Provinces and the breeding of horses made a safe venture again. Mange in cattle was another scourge that yielded to the aggressive campaign of eradication directed by Dr. Torrance. A tuberculosis eradication campaign was initiated during his administration. Glanders was practically eliminated and several outbreaks of hog cholera, introduced by garbage feeding, were controlled in their incipiency. During the 1914-15 outbreak of foot-and-mouth disease in the United States, the plague was kept out of Canada by carefully guarding the possible points of entry along the border.

On his retirement, in 1923, he became associated with the Ontario Veterinary College, as Professor of Physiology and Hygiene. During his course at McGill University he had pursued special studies in physiology, under the renowned Dr. Osler, and later, in conjunction with Dr. Swale Vincent, Professor of Physiology at the University of Manitoba, he conducted some special researches on internal secretions relating particularly to the ductless glands. As a teacher he endeared himself to the students and through his death the College and faculty have lost a staunch friend and able colleague.

Among the other important positions held by Dr. Torrance were: President of the Manitoba Veterinary Association, Honorary President of the Ontario Veterinary Association, Professor of Veterinary Science in the Manitoba Agricultural College.

Dr. Torrance joined the A. V. M. A. in 1900 and always took a prominent part in the transactions of the Association. He was a regular attendant at the annual conventions, having missed but few during the time he was a member. He served as Resident Secretary of the Province of Manitoba for nine years (1903-12), as a member of the Committee on Intelligence and Education (1903-04 and 1915-16), as chairman of the Necrology Committee

(1905-06), as a member of the Resolutions Committee (1909-10), as a member of the Publication Committee (1910-11), as a member of the Executive Committee (1900-01) and 1912-13 and as a member of the International Committee on the Control of Bovine Tuberculosis, from 1909 until 1919.

On two occasions Dr. Torrance was elected a vice-president of the Association, in 1900 and 1913. In 1917 he was elected president, at the Kansas City meeting. This was during the Great War, and the action of the Association, in elevating Dr. Torrance to the presidency at that time, was regarded not only as a mark of recognition of his professional attainments, but as an act of international courtesy, indicative of the close alliance of the people of the two great countries on this side of the water, against a common foe.

B. G. BRYSON

Dr. B. G. Bryson, of Shreveport, La., died May 11, 1924, after a brief illness.

Born September 1, 1891, at Shreveport, Dr. Bryson attended high school and the Chicago Veterinary College, having been graduated in 1915. He had been in active practice in Shreveport ever since.

Dr. Bryson joined the A. V. M. A. in 1918. He was vice-president of the North Louisiana Veterinary Medical Association, a member of the Alpha Psi Fraternity and a Mason. He is survived by his widow, four children, his father, two sisters and three brothers, one of whom, Dr. G. A. Bryson, is a veterinarian. He has taken over the practice left by his brother.

CHARLES H. YOUNG

Dr. Charles H. Young, of Ellis, Kansas, died June 27, 1924, after a brief illness.

Born at Hiawatha, Kansas, June 14, 1889, he attended high school and received his veterinary education at the Kansas City Veterinary College. He was graduated in 1912, and immediately located at Ellis, where he established a good practice. He was one of the first graduate veterinarians to venture out into the "short grass" country and was one of the few who "stuck it out."

Dr. Young served in the Veterinary Corps, during the recent war, as second lieutenant in the transport service. He will be

remembered by his comrades as a square shot and a fine fellow. In his home community he was regarded as a good citizen and he commanded the respect of all who knew him.

Dr. Young joined the A. V. M. A. in 1918. He is survived by his widow, his mother and four brothers.

K. J. M.

HARRY LUKES

Dr. Harry Lukes died at his home, in Springfield, Mass., July 2, 1924, following a two-day illness caused by cerebral hemorrhage.

Born in Cornwall, England, April 9, 1866, he received his early education at Cornwall and Devon. His veterinary training was received at the Royal College of Veterinary Surgeons, London, from which institution he was graduated in 1887. He came to America the year following and located in Springfield, Mass. For several years he held the position of Inspector of Animals, Meats and Provisions for the City of Springfield.

Dr. Lukes joined the A. V. M. A. in 1901. He was a member of the Massachusetts Veterinary Association, the Kiwanis and the Automobile Clubs of Springfield. He is survived by his widow, one daughter, one brother and one sister.

WILLIAM WRAY STORK

Dr. William W. Stork died at his home, in Brampton, Ont., July 4, 1924. He had not been in good health for some time, latterly becoming seriously ill, from which he succumbed. He was in his 62nd year.

Born at Brampton, Ont., he received his early education in that town, and was a graduate of the Brampton High School. As a young man he entered the Ontario Veterinary College and was graduated in 1884, after which he conducted a private practice for some years. About the year 1901 he received an appointment as Veterinary Inspector, under the Health of Animals Branch, at Ottawa, in which service he remained until the time of his death.

Dr. Stork joined the A. V. M. A. in 1916. He was well known and highly esteemed by the profession in Ontario. He was unmarried.

R. A. McI.

J. H. BAUGHMAN

Dr. J. H. Baughman, of Mechanicsburg, Ohio, died June 9, 1924, at the age of 82 years. He had been in failing health for some time. Dr. Baughman was a veteran of the Civil War and a member of the Tenth Ohio Cavalry and Infantry.

J. J. STRENG

Dr. J. J. Streng died at his home in Melrose, Kansas, May 6, 1924, following an operation in a Kansas City hospital a few weeks previously. He was in his sixty-first year. Dr. Streng was graduated from the Western Veterinary College, in 1905. He is survived by his widow and one daughter. He was buried at New Palestine, Ind., the place of his birth.

HON. RAYMOND CASSADY

Hon. Raymond Cassady, Iowa State Secretary of Agriculture, was found dead in bed at the home of J. L. Gillespie, Mrs. Cassady's brother-in-law, the morning of July 7, 1924. It is believed that death was due to heart disease. Before taking up his official duties, Mr. Cassady was engaged in farming and stock raising, near Whiting. He was in his 44th year.

Dr. James W. Swales died suddenly, at his home, near Bright, Ind., June 23, 1924. He was a registered non-graduate, but had not been in active practice for the past few years. His father, Francis Swales, one of the early settlers of Harrison Township, practiced veterinary medicine.

Dr. Gilbert G. Drummond, of Philadelphia, Pa., died May 6, 1924. He was a graduate of the University of Pennsylvania, class of 1896, and was engaged in active practice, in Philadelphia, for over twenty years.

Our sympathy goes out to Drs. C. W. Hobbs and Lucien E. Hobbs, father and brother, respectively, of Harold Hobbs, who lost his life by drowning in the Blue River, north of Manhattan, Kans., June 6, 1924.

Our sympathy goes out to Dr. Henry Hell, of Wilton Junction, Iowa, in the death of his daughter, by drowning, recently.

Our sympathy goes out to Dr. Maurice C. Hall, of Washington, D. C., in the death of his mother, recently.

MARRIAGES

Dr. W. C. Sprinkle (T. H. '11), of Oaktown, Ind., to Miss Doris V. Denny, of Plainville, Ind., June 1, 1924.

Dr. Donald D. Baker (Iowa), of Wabash, Ind., to Miss Edith Swain, of West Liberty, Iowa, June 25, 1924.

Dr. Cameron M. Smith (K. S. A. C. '15), of Wakefield, Kans., to Miss Velma Mary Walters, May 3, 1924.

Dr. L. V. Skidmore (K.S.A.C.), of Lincoln, Nebr., to Miss Marguerite A. Rice, of Lincoln, Nebr., June 16, 1924.

Dr. M. P. Schlaegel (K. S. A. C. '20), of Burr Oak, Kans., to Miss Clara Froom, of Vermillion, Kans., June 4, 1924.

Dr. Harry J. Austin (K. S. A. C. '19), of Letts, Iowa, to Miss Beulah May English, of Effingham, Kans., at Manhattan, Kans., June 22, 1924.

BIRTHS

To Dr. and Mrs. A. S. Morris, of Galva, Iowa, a daughter, Genevieve, June 14, 1924.

To Dr. and Mrs. J. F. Stockard, of Lees Summit, Mo., a son, Joe Lee, May 5, 1924.

To Dr. and Mrs. C. E. Long, of Blue Mound, Kans., a son, Ovid Gale, May 27, 1924.

To Dr. and Mrs. J. P. Scott, of Manhattan, Kans., a son, Lawrence William, June 10, 1924.

To Dr. and Mrs. W. W. Dimock, of Lexington, Ky., a daughter, Ruth Mudge, July 6, 1924.

To Dr. and Mrs. W. C. Clark, of Canistota, S. D., a daughter, Constance Yvonne, May 10, 1924.

PERSONALS

Dr. L. L. Breeck has located at Warsaw, Ky.

Dr. G. E. Talley has opened an office in Waverly, Tenn.

Dean and Mrs. V. A. Moore are enjoying a trip to Europe.

Dr. M. Grootes (Chi. '14) is now located at Hansen, Idaho.

Dr. Benj. H. Steiner (Ind. '24) has located at Ottawa, Ohio.

Dr. W. R. Younger is County Veterinarian of Hildago County, Texas.

Dr. Raymond D. Coneley (U. P. '23) has removed from Media to Lima, Pa.

Dr. Willis A. Myers (Chi. '94) has been appointed postmaster at Wenona, Ill.

Dr. F. A. Hall has associated with Dr. H. Killips, in practice at Oskaloosa, Iowa.

Dr. J. R. Payne has removed from Jackson, Tenn., to Somerville, same state.

Dr. C. L. Smith, formerly at Hopkinsville, Ky., has located at Elizabethtown, Ky.

Dr. W. V. Swiger (San. Fran. '12) removed from Wendell, Idaho, to Buhl, Idaho, July 1.

Dr. J. W. Drage, of Laurel, Miss., is assisting Dr. J. R. Fallis, in his practice at Milan, Ind.

Dr. R. S. Beaver (K. S. A. C. '23) has removed from Shelby, Iowa, to Harlan, same state.

Dr. M. W. Roy, of Clark, S. D., is serving as Mayor of his city, as well as Road Commissioner.

Dr. L. O. Lietzman (Ind. '24) has taken over the practice of Dr. LaRue Davis, at Plainfield, Ind.

Dr. August F. Burger (Iowa '24) has purchased the practice of Dr. J. A. Brill, at Dow City, Iowa.

Dr. C. C. Clay (Chi. '14), of Marshalltown, Iowa, has accepted a government position in Panama.

Dr. H. M. Warner (O. S. U. '24) has purchased the practice of Dr. E. E. Manter, at Urbana, Ohio.

Dr. H. L. Smith, of Lewis, Iowa, has purchased the practice of Dr. R. A. Lantz, of Atlantic, Iowa.

Dr. O. H. Cripe has associated with Dr. T. O. Keller, in practice at 53 West Second St., Peru, Ind.

Dr. R. E. Kepner has established himself in a new office at his residence, 1320 Vine St., New Castle, Ind.

Dr. J. A. Brill (Colo. '12), of Dow City, has disposed of his practice, but will remain in Dow City indefinitely.

Dr. B. W. Conrad (K. C. V. C. '07) of Sabetha, Kans., attended the recent Shrine Convention, in Kansas City.

Dr. N. I. Stringer (Chi. '89), of Cornell, Ill., has purchased the practice of Dr. Willis A. Myers, at Wenona, Ill.

Dr. H. J. Hinson, of Dyersburg, Tenn., was recently appointed to the position of Sanitary Officer of his city.

Dr. Mark Bonifield (O. S. U. '24) has accepted a position on the staff of the State Veterinarian of North Carolina.

Dr. Rufus B. Reeser, of Lena, Ill., with Mrs. Reeser, celebrated their golden wedding anniversary, June 14, 1924.

Dr. Fred W. Caldwell (K. S. A. C. '07) is County Agent of Finney County, Kansas, with headquarters at Garden City.

Dr. E. E. Patterson (Gr. Rap. '01), of Detroit, Mich., is using chlorin gas in the treatment of his small animal patients.

Dr. B. J. Eno (O. S. U. '08) has removed from East Cambridge, Mass., to Somerville, Mass. Address: 127 Hudson St.

Dr. Glenn V. Grewell (Iowa '24), of Ferguson, Iowa, has bought the practice of Dr. C. C. Clay, at Marshalltown, Iowa.

Dr. O. R. Conley (Cin. '17), formerly at Mahnattan, Kans., is now in Columbus, Ohio. Address: 241 Deshler Ave.

Dr. W. C. Dendinger (St. Jos. '16), formerly stationed at Goldsboro, N. C., is now at Raleigh, N. C., 320 Agricultural Bldg.

Dr. C. J. Marshall (U. P. '94) of Philadelphia, Pa., is spending his vacation on his farm, at Tinker Hill, Bradford County, Pa.

Dr. O. B. Morgan (K. C. V. C. '14) has removed from Canton to Hutchinson, Kan., where he is engaged in small animal practice.

Dr. L. C. Henderson (K. C. V. C. '04) has been transferred from Ogden, Utah, to Muncie, Ind., on hog cholera control work.

Dr. F. B. Shaw, of Middleville, Mich., has been granted a patent on an all-metal air pump which he will put on the market.

Dr. D. F. Piper (Chi. '14), of Hammond, Ill., has removed to Cerro Gordo, Ill., to take up the practice of the late Dr. Hammert.

Dr. Fred Crow (K. C. V. C. '18), of Iowa City, Iowa, was recently confined to the hospital incident to having his tonsils removed.

Dr. H. A. Wilson (K. C. V. C. '13), State Veterinarian of Missouri, broadcasted an address on rabies, from Jefferson City, June 30.

Lt. Col. Walter Fraser (Chi. '99) has been transferred from Governors Island, N. Y., to The Presidio of San Francisco, California.

Dr. James F. Adey (K. S. A. C. '23), of Stanberry, Mo., has been appointed Deputy State Veterinarian, for a term ending Jan. 11, 1928.

Dr. Roy Houser, of Bourbon, Ind., narrowly escaped serious injury when he was kicked in the face by one of his equine patients recently.

Dr. Dudley D. Conner (K. C. V. C. '11) has removed from Marianna, Ark., to Fort Smith, same state. Address: 908 N. 35th Street.

Capt. Max Siereveld, Jr. (Cin. '09) has been transferred from duty at Walter Reed Hospital, Washington, D. C., to Fort Sheridan, Ill.

Dr. Harold T. Melgaard (O. S. U. '24), of Columbus, Ohio, sailed from New York, for Norway, July 25, to be gone three or four months.

Lt. Harry J. Juzek (Iowa '16) has been transferred from Fort Robinson, Nebr., to the Station Veterinary Hospital, Fort Des Moines, Iowa.

Dr. F. N. Elwell (Iowa '02) is B. A. I. Inspector-in-Charge, Virus-Serum Control, Wichita, Kans. His new address is: Rm. 6, Federal Bldg.

Dr. L. C. Drum, formerly of Iowa Falls, Iowa, has located in Dixon, Ill., where he is acting as veterinarian for a live stock insurance company.

Dr. L. L. Criswell, of Evansville, Ind., recently delivered an address on tuberculosis eradication before a group of farmers at Warrentown, Ind.

Dr. W. G. Neilson, of Monmouth, Ill., was recently tendered the position of County Veterinarian for Rock Island County (Ill.), but turned it down.

Dr. J. W. Lumb (K. S. A. C. '10), of Sioux City, Iowa, has accepted the position of Extension Veterinarian at the Kansas State Agricultural College.

Dr. R. J. Spain, of North Lewisburg, Ohio, has received an appointment in the B. A. I., and assigned to meat inspection at National Stock Yards, Ill.

Dr. C. S. Stroehlein, of Cincinnati, Ohio, has accepted an appointment in the B. A. I., and reported for duty on meat inspection work at St. Louis, Mo.

Dr. Timothy F. O'Dea (U. P. '10), of Union Hill, N. J., received the degree of Doctor of Dental Surgery, at the University of Pennsylvania, in June.

Dr. Zay Shum (K. C. V. C. '07), of Biggsville, Ill., recently underwent cholecystotomy and appendectomy operations at the Burlington (Iowa) Hospital.

Dr. Wm. M. Bell (K. C. V. C. '92), of Nashville, Tenn., has been reappointed a member of the Tennessee State Board of Veterinary Medical Examiners.

Dr. L. W. Goss (O. S. U. '05), of Ohio State University, delivered an address on "Poultry Diseases," at the poultry field day and picnic, held at Rushville, Ohio, July 1.

Dr. E. E. Manter (O. S. U. '13) has disposed of his practice at Urbana, Ohio, to accept a position with the U. S. Bureau of Animal Industry, at Wheeling, W. Va.

Dr. F. C. Streeter and Dr. A. Goodlove (O. S. U. '10) have bought the practice of Dr. W. B. Welch (Iowa '83), at Marshall, Mo. Dr. Goodlove was associated with Dr. Welch.

Dr. Lewis P. Koster (U. P. '12), who has been teaching in the College of Veterinary Science, Los Banos, Laguna, P. I., for the past three years, was a recent visitor in Philadelphia.

Dr. J. P. Scott (O. S. U. '14), Associate Professor of Veterinary Pathology, Kansas State Agricultural College, received the degree of Master of Science, from the same institution, in June.

Dr. LaRue Davis (Ind.), who has been in practice at Plainfield, Ind., for the past fourteen years, has removed to Indianapolis, where he will be associated in practice with his father, Dr. Emmet Davis.

Dr. C. F. McKinney (T. H. '13), Coles County (Ill.) veterinarian, is recovering from a seriously burned hand, received when he was butted by a ram, while carrying a red hot branding iron used in branding a reacting cow. The iron was jammed through the palm of his right hand.

Dr. C. S. Haywood (Ont. '02), of Mattoon, Ill., was recently called upon to defend himself against a charge of alleged violation of a city ordinance in conducting a veterinary hospital in the rear of his home.

Dr. C. B. Knowles, of Sioux City, Iowa, sought the Republican nomination for Supervisor from the First (Sioux City) District; in the recent primaries. His campaign slogan was: "Go to the polls and vote for Knowles."

Dr. Clarence W. Swingley (Chi. '09), of Freeport, Ill., has been appointed County Veterinarian by the Board of Supervisors of Stephenson County, succeeding Dr. O. H. Lintner, who has taken a similar position in De Kalb County.

Dr. Russell A. Runnels (Mich. '16), for a number of years a member of the Veterinary Faculty at Michigan Agricultural College, has been appointed Associate Animal Pathologist at the Virginia Polytechnic Institute, Blacksburg, Va.

Dr. E. D. King (Ala. '16), of Valdosta, Ga., has brought the standard of meat and milk inspection in his city to such a high plane that it has attracted nation-wide attention, according to an article in the *Southern Tobacco Journal*, for May 27, 1924.

Dr. F. M. Hayes (K. S. A. C. '08), of the Division of Veterinary Science, University of California, is taking a year's Sabbatical leave and will pursue post-graduate studies in the University of Pennsylvania Graduate School of Medicine in the fall.

Dr. T. P. Haslam (K. S. A. C. '14) received the degree of Doctor of Medicine, conferred by the University of Nebraska, at the close of the 1923-4 college year. He will serve as an interne, for a year, at the Jenny Edmondson Hospital, Council Bluffs, Iowa.

Drs. G. R. Killian (K.S.A.C. '24) and F. P. Burke (K.S.A.C. '24) have received commissions as second lieutenants in the V. O. R. C. Both completed the advanced course in Veterinary Military instruction at the Kansas State Agricultural College.

Dr. R. P. Steddom (Ont. '86) has been Acting Chief of the Bureau of Animal Industry, in the absence of Dr. John R. Mohler, who went to California about the middle of June, to straighten out some matters in connection with the outbreak of foot-and-mouth disease.

Dr. Alvin Broerman (O. S. U. '09) has taken over the duties of assistant pathologist, in addition to his own as bacteriologist, at the Ohio State Serum Plant, at Reynoldsburg. This change was made necessary by the resignation of Dr. E. W. Porter, announced in the July JOURNAL.

Dr. Gerard Dikmans (Mich. '20) has been appointed to the position of Associate Parasitologist, at the Federal Experiment Station, Mayaguez, Porto Rico, after four years of post-graduate work at the University of Minnesota, in the Division of Entomology and Economic Zoology.

Dr. W. R. Morgan, of Jeffersontown, Ky., and his two sons, George, 5, and Charles, 7, owe their lives to "Bounce," their fox terrier, who awakened his master as flames were consuming the house, at an early morning hour. Dr. Morgan's hands were burned but the children were uninjured.

Dr. D. C. Grinnell, of Libertyville, Ill., County Veterinarian of Lake County, recently had his automobile wrecked by a reckless driver going fifty miles an hour on the Milwaukee Road, just north of Wheeling. Dr. Grinnell escaped serious injury and was promised a new car by the speedster, according to report.

Dr. Wm. H. Ridge (U. P. '88), of Somerton, Pa., a former employe of the Pennsylvania Bureau of Animal Industry, reached the seventieth milestone of life on July 16. He has been confined to his room for several years on account of physical disability. Dr. T. E. Munce, Director of the Bureau, visited Dr. Ridge on his recent birthday, and found him to be much improved and in a happy frame of mind. Dr. Ridge sent his best regards to his former associates and many friends in the veterinary profession.

